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This number contains the two addresses delivered before the Royal College of Physicians and Surgeons of Canada last October.

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SIR FREDERICK BANTING, K.B.E., M.C., M.D.,
LL.D.(QU., WEST.), D.SC.(TOR., YALE, NEW YORK), F.R.S., F.R.C.P.(LOND.),
F.R.C.S.(ENG.), F.R.S.C., F.R.C.S.(C.),

Professor of Medical Research in the University of Toronto, and
Major in the Canadian Army Medical Corps

In Memoriam

SIR FREDERICK BANTING died in Newfoundland on February 21st as the result of a flying accident. He was on his way to England in the service of the Canadian Government. Canada has lost a great citizen, the medical profession one of its most distinguished scientists, and humanity a benefactor without equal in this generation.

Frederick Grant Banting was born in Alliston, Ontario, on November 14, 1891, the son of William Thompson Banting and Margaret Grant Banting. Educated at the Alliston Public and High Schools, he entered the medical course of the University of Toronto in 1912. In 1915 he enlisted as a private but was ordered back to finish his university training. Graduating in 1916, he at once joined the Canadian Army Medical Corps. He was wounded at Cambrai in September, 1918, and was awarded the Military Cross for valorous conduct during the Cambrai engagement.

Dr. Banting served as resident surgeon in the Hospital for Sick Children, Toronto, in 1919 and 1920. He then moved to London, Ontario, and occupied the post of research assistant in the Department of Physiology of the University of Western Ontario for the session of 1920-1921.

In his Cameron Lecture in 1927 Banting described in detail the start of the investigations which led to the discovery of the internal secretion of the pancreas. This work was begun on May 16, 1921, in collaboration with the writer, who had been asked by Professor J. J. R. Macleod, Head of the Department of Physiology to participate. The memory of the intimate association with Banting during that spring, summer and autumn, when it became clear that an active diabetic principle could be prepared from degenerated or from normal pancreas, will always be cherished. The intense excitement and pleasure with which we watched the depth of colour in the sugar reagent fade as the blood sugars of the diabetic animals became reduced under the action of insulin is difficult to describe. At the beginning of the investigations the surgical aspects of the problem were entirely in Banting's hands while more chemical procedures fell to my lot. Later he taught me the essentials of surgical technique, and he acquired considerable skill in the estimations of sugar and of the other constituents in which we were interested. The animals were nursed as carefully as the somewhat limited facilities permitted, and each one was indelibly printed in our memories by virtue of some specific point which the observations on it established. We were soon completely convinced that success had been achieved and looked forward with eager anticipation to the application of our findings to the human diabetic. In those days most of our time was spent in the laboratory where we frequently slept and prepared our meals.

When Professor Macleod returned to his laboratory in the autumn of 1921 the work was continued under his general direction. Banting was given an appointment as lecturer in the Department of Pharmacology under Professor V. E. Henderson. During the following year, when he became interested in the clinical application of insulin, he was appointed senior demonstrator in the Department of Medicine under Professor Duncan Graham, a position which he held until 1923 when the Banting-Best Department of Medical Research was created and he was installed as Director. The chair was supported in part by an annual grant voted by the Legislature of the Province of Ontario. In the same year the Parliament of Canada provided Banting with a life annuity.

In the years following the discovery of insulin the whole scientific world joined to honour Banting with a galaxy of awards and medals. It will always be a source of gratification to his colleagues in the University of Toronto that they were among the first to recognize the greatness of the man. In 1922 he received the Starr Gold Medal for his M.D. thesis and the George Armstrong Peters Prize for his important contributions to surgical science. In 1923 he received the Reeve Prize which is awarded for a published report of the best scientific research accomplished in any department of the Faculty of Medicine by a junior member of the staff, and in the same year the Charles Mickle Fellow-

ship which is awarded to that member of the medical profession (anywhere) who is considered by the Council of the Faculty of Medicine of the University of Toronto to have done most during the preceding ten years to advance sound knowledge of a practical kind in medical art or science. The Nobel Prize in Medicine was awarded to Drs. Banting and Macleod in 1923. Banting immediately divided his share equally with the author, and Professor Macleod with Dr. J. B. Collip who joined our group in the autumn of 1921 and who had made several very important contributions within a short period of time.

Banting became an honorary member of most of the outstanding scientific and medical societies of the world. Awards followed each other in rapid succession: the Johns Scott Medal (Philadelphia) in 1923, the Rosenberger Gold Medal (Chicago) in 1924, the Cameron Prize (Edinburgh) in 1927, the Flavelle Medal of the Royal Society of Canada in 1931, the Apothecaries Medal (London) in 1934, and the F. N. G. Starr Gold Medal of the Canadian Medical Association in 1936.

In recognition of his great service to science and humanity Dr. Banting was created Knight Commander of the Civil Division of the Order of the British Empire in June, 1934. In the following year he was elected a Fellow of the Royal Society of London.

The exceptional mental equipment with which Banting was endowed enabled him to overcome many obstacles which would have deterred a less forceful personality. His scientific curiosity was never satisfied and his energy when he was interested in a problem knew no bounds. His training as a practical surgeon served him well on numerous occasions and he was always interested in the fundamental aspects of the problems which he attacked. His experiences during the Great War as a battalion medical officer made a lasting impresion on his mind. He was never too busy to leave the laboratory in order to set a fracture or to perform a surgical operation on one of his army comrades or on some patient who was in need. His predominant thoughts, even in his last hours, would be to do his utmost to relieve the sufferings of others.

After the discovery of insulin he made a vigorous and sustained attack on the physiological problems associated with the suprarenal gland. Later he made a significant advance in our knowledge of the etiology of cancer. It will not be possible here to describe all his contributions to medicine. He gathered around him a group of young men whose interest in research he fostered and encouraged. His laboratory made a substantial contribution to the work on silicosis. He provided a sanctuary for scientists who had been driven from their homes. He was interested in and helped every young man who appealed to him for an opportunity to investigate medical problems.

Banting had a very definite philosophy of life which he once expressed in the following words:

"It is not within the power of the properly constructed human mind to be satisfied. Progress would cease if this were the case. The greatest joy in life is to accomplish. It is the getting, not the having. It is the giving, not the keeping.

"I am a firm believer in the theory that you can do or be anything that you wish in this world, within reason, if you are prepared to make the sacrifices, think and work hard enough and long enough."

Although Sir Frederick's great energies were devoted for the most part to scientific research on medical problems, he had many other interests in which he always hoped to indulge more fully after he had retired from active work. A member of the Arts and Letters Club of Toronto, he was one of Canada's most accomplished amateur painters. His oils of Quebec scenes, of Arctic life, and of the Canadian Rockies form a valuable addition to the available artistic records of those regions.

In 1938 Banting's intuitions stimulated him to approach the military authorities in Ottawa with plans for the formation of a research organization to study the peculiar problems of aviation medicine. At the outbreak of the present war this work was under way. He was Chairman of the Associate Committee on Medical Research and of the Sub-Committee on Aviation Medicine of the National Research Council of Canada. He was also an adviser to Brigadier Gorssline, Director-General of Medical Services of the Royal Canadian Army Medical Corps. Few Canadians have played a rôle so important in Canada's war effort; none with the same self-effacing modesty. Sir Frederick died as he had lived—in the service of his country and of humanity. Our deepest sympathy goes out to Lady Banting.

C. H. BEST

The Canadian Medical Association Journal

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RECENT ADVANCES IN MEDICINE—ETIOLOGY AND THERAPY*

THE 1940 LECTURE OF THE ROYAL COLLEGE OF PHYSICIANS OF CANADA

BY A. H. GORDON, M.D., F.R.C.P.(C.)†

Montreal

ANY one of us in looking through an anthology might wonder why some poem was included and another left out, and for the same reason some one here may wonder why under the above title certain subjects are given consideration and others are not, but if we were unanimous about everything, this world would be, as a patient once described his Lenhartz diet, "innocent but dull".

The same difference of opinion will arise about the definition of the word "recent". To a geologist I presume anything would be "recent" which occurred after the appearance of man upon the earth, while to some very modern periodicals anything which occurred last week would be hopelessly passé; and so I apologize to the bright young people and to the elder statesmen if either too much or too little is called "recent". One is also confronted with a dilemma, one horn of which is to accept as an "advance" something recent but yet untried, and the other horn is to reject some advance until it is tried so long that it is no longer recent. Guarded by these protective remarks, I may venture into my subject.

Logically etiology should precede therapy, and I wish to call your attention first to the phase of the etiology of disease which has for some years aroused much interest, and that is the group of viruses.

J. H. Mueller,[1] of Harvard, outlines the properties of filterable viruses with the statement that up to 1920 it was held that viruses were ultramicroscopic living organisms differing in no essential way from bacteria. They were believed to develop by multiplication from pre-existing forms which gained access to a suitable culture medium such as the cells of a susceptible host. Later there was a tendency to consider the viruses as non-vital, enzyme-like materials, produced by cells under suitable conditions. Finally, there is a middle view which places the viruses in a category somewhat below the free living bacterial cell in complexity, in that they are deficient in some of the functions essential to growth and reproduction, and thus limited in habitat to a ready source of materials which they themselves are not capable of synthesizing. This view, however, holds that the virus is "living", in the sense that it divides when placed in a suitable environment, and that multiplication is due to its own vital force, the host's part being a passive one, and the host being a living cell.

The size of the virus element has been determined by three methods: (1) by dark field microscopy or photography with ultra-violet light; (2) by filtration through collodion membranes of graded size of pores; and (3) measurement of its rate of sedimentation during very high speed centrifugation. The filterable viruses include substances varying in size from the lower limits of visibility by the microscope down to bodies of the dimensions of molecules. The virus of psittacosis or parrot fever is at the upper level, and next to it the virus of vaccinia, and in the lower ranges comes the virus of poliomyelitis. To use illustrative similes, the virus of poliomyelitis could contain 8 hæmoglobin molecules, whereas the psittacosis virus could contain 125,000. The particules of vaccinia virus are visible as elementary bodies or Paschen bodies,

* Delivered before the Royal College of Physicians and Surgeons of Canada, Ottawa, October 26, 1940.

† Consulting physician to the Montreal General Hospital.

after the name of the observer, and it is held that these elementary bodies bear the same relation toward infectivity as do the individual organisms in a culture of pneumococcus or anthrax bacillus.

Chemical analysis of the centrifuged and dried virus material showed that its composition was similar to that of bacterial cells.

The elementary bodies of vaccinia are agglutinated by specific immune sera just as bacteria are. Attempts to demonstrate respiration or other vital processes inherent in the elementary bodies have been completely negative. It appears, then, that the elementary body of vaccinia may be held to represent a microorganism differing from the staphylococcus, for instance, in being smaller, and in being deficient in certain enzyme systems. In order that the virus may multiply it must find an environment in which these enzyme systems are already functioning, and then appropriate the systems, or their products, to its own use. The virus thus becomes a parasite of certain cells which lack some mechanism necessary to repel the virus invader.

Zinsser[2] pointed out that, as in bacterial diseases, a virus may be highly individual or widely promiscuous in the subjects of its attacks. Thus, only man can be successfully infected by the virus of herpes zoster, chicken-pox, or the original encephalitis lethargica of Von Economo; and the Rous sarcoma virus is virulent only for chickens. At the other end of the scale, rabies virus can cause fatal disease in a large variety of animals. Between the two extremes lie all degrees of infectiousness.

Poliomyelitis attacks only man and the monkey; the virus of human influenza, only man, ferrets and white mice; that for the St. Louis encephalitis, on first isolation from man, only monkeys and a special strain of inbred Swiss mice; the agent of equine encephalomyelitis is infective for man, mice, guinea pigs, rabbits, birds and mosquitoes; and the virus of yellow fever for man, monkeys, mice and mosquitoes.

A given virus when passed repeatedly through a particular species of animal may increase in virulence for this species while diminishing in virulence for other species. One example of this is the rabies virus, which when passed through rabbits assumes a high infectiousness for rabbits but diminishes in infectivity for monkeys, dogs and man. The question of virus alternation between chicken-pox and herpes zoster is not settled, but enough cases are reported to keep the subject open (Kundrat).

The immunity to virus agents follows no law. To smallpox, poliomyelitis, yellow fever, fowl plague, hog cholera and canine distemper, immunity usually lasts for life; in dengue fever it lasts one or two years; and in herpes simplex recurrence is almost the rule.

Active immunization against virus diseases is in its infancy, but tissue cultures furnish a simple method for obtaining virus agents in larger quantity, and progress is anticipated. Zinsser stated that large scale human vaccination against poliomyelitis with virulent tissue material is dangerous, since no criteria exist for measuring the specific virulence of such preparations or for determining whether such preparations are actually killed or attenuated.

Passive immunity against virus diseases has made little headway. Kramer and Aycock[3] in 1932, Park[4] in 1932, and Fischer[5] in 1934, found no definite evidence of its efficacy from their statistical studies in the cases given convalescent serum for prophylaxis against poliomyelitis. In measles, the use of convalescent serum given in 5 c.c. dosage within four days of exposure will usually protect, and is of value in modifying the course of the disease if given in the preeruptive stage.

A virus disease which in recent years has become important to human beings is the virus of equine encephalomyelitis. Two types are described, the "eastern" type found in horse epizootics east of the Appalachian Mountains, and the "western" type, as its name implies, found in the western portions of the continent. The western type has been found to be transmitted by a mosquito, the *Ædes Egypti*, and also by wood ticks. In 1938 it was found that both types of the disease occurred in man. The eastern disease has a high mortality in man. The virus was isolated from a flock of sick pigeons observed in the region of a horse epizootic. Pheasants, ducks, wild geese and European blackbirds have also been hosts to the virus, suggesting that wild migratory birds may transfer the disease from one region to another.

Zinsser has laid stress upon the importance of insect vectors in the transmission of the virus diseases, and in 1939 Goggleshill announced the biologic transmission of lymphocytic choriomeningitis through the mosquito *Ædes Egypti*. This disease, or syndrome, described in the last few years, should be suspected in patients having

a history of a previous respiratory infection who show signs of an acute inflammatory reaction of the cerebrospinal system, and who present a lymphocytosis in a bacteria-free spinal fluid. Recovery has been the rule, occasionally with some intracranial damage. The course is from 10 days to a number of weeks. All strains of the virus are pathogenic for mice on intracerebral inoculation. Breslich, Rowe and Lehman[10] reported in November, 1939, 23 cases of acute epidemic encephalitis in North Dakota, where it had not been previously observed, but the serum did not agglutinate the virus of lymphocytic choriomeningitis.

The most important virus disease of man is epidemic influenza. Our later knowledge of the disease dates from 1933 when Smith, Andrewes and Laidlaw[7] isolated a virus from patients ill with influenza by injecting ferrets intranasally with nasopharyngeal washings from these patients. The ferrets acquired the disease and were then immune to reinfection, and their blood serum neutralized the virus.

An epidemic of swine influenza (''hog flu'') had been prevalent since 1918, and Shope[6] in 1931 demonstrated that the disease could be transmitted by intranasal injection of bacteria-free filtrates of infected swine lung tissue, but found that a bacterial agent, *Hæmophilus influenzæ suis,* was also necessary for the production of the typical epidemic disease. Smith, Andrewes and Laidlaw transferred the virus of swine influenza to ferrets and found that it produced in them a similar but more severe disease than did the human virus. Then they found that a ferret convalescent from swine influenza was immune to human influenza virus, but a ferret infected with human influenza could be reinfected with swine influenza. In no instance has the virus been transmitted by any other route than the respiratory tract. Some Russian experimenters[8] have infected human volunteers with a mouse lung suspension of two strains of influenza virus, by spraying it into the nose. Twenty per cent of the volunteers developed symptoms similar to the common cold.

It thus appears that tissue culture and mouse passage human influenza can produce a respiratory infection indistinguishable from influenza if the virus is injected intranasally in sufficient quantities, and these results are strong evidence that a virus is the cause of at least one group of respiratory infections which are clinically and epidemiologically epidemic influenza.

The following paragraph from an article on ''Human and swine influenza'' by J. B. Mote,[9] of Boston, is a useful summary of our present knowledge.

> ''We know at least some epidemics of clinical influenza are caused by related viruses, but the etiology of pandemic influenza is still an open question. Thus, in spite of our progress in the study both of influenza and other human respiratory infections, the problem in its broader sense remains unsolved; and respiratory epidemics can still intermittently incapacitate large portions of most populations, and can periodically devastate the world. In the absence of more complete and specific information concerning respiratory virus infections, it is evident that a public health effort at specific prevention in this group of disease is both premature and unwise.''

Reimann and Havens,[11] in a group of cases of clinical influenza, failed to find the man-ferret virus, and suggest that another virus to which the ferret is not susceptible may be responsible.

HYPERTENSION

A very notable advance in the study of hypertension is due to Goldblatt, a Canadian graduate. The association of hypertension and nephritis was universally recognized, and Goldblatt[12] adopted the following working hypothesis. If organic disease of the kidney be the initiating factor in the pathogenesis of benign hypertension, then this disease is in all probability the arteriolar sclerosis which is so frequently associated with the kidney. It was demonstrated that decrease of the lumen of the renal artery by varying degrees of compression by clamps caused an immediate decrease of blood flow through the kidney. Constriction of one renal artery resulted in elevation of blood pressure, which persisted for weeks or months, but adequate constriction of both renal arteries resulted in persistent hypertension. This persistent hypertension resulted also from clamping of one renal artery, and later, removing the other kidney. This hypertension caused elevation of both systolic and diastolic pressures.

Disturbance of renal function also results from constriction of the renal arteries or of the aorta above them. A good example of this mechanism is the hypertension occurring in coarctation of the aorta.

Two possible mechanisms might bring about this pressor effect—either a nervous reflex from the ischæmic kidney, which would affect the general vasomotor apparatus, or a humoral process set up by the ischæmic kidneys, which causes constriction of the peripheral vessels. That the ischæmic kidneys are responsible is

shown by the following facts. (1) If the ischæmic kidney is removed the blood pressure falls. (2) If the clamp on the ischæmic kidney is removed the blood pressure falls also. (3) If the kidneys are clamped and the clamp is removed from one the blood pressure falls more slowly. If both clamps are removed the blood pressure falls promptly. (4) If one kidney is removed and the other is transplanted elsewhere in the body, constriction of the blood supply to the transplanted kidney results in elevated blood pressure. (5) Bilateral nephrectomy is not followed by persistent hypertension. These results indicate that the kidney is responsible for the effect, and that it must be present in the body to cause it.

Section of the splanchnic nerves and excision of the lower thoracic ganglia, or of the anterior roots from the 6th dorsal to the 2nd lumbar level, or excision of the entire sympathetic system have failed to reduce hypertension as long as the main renal arteries remain constricted. Bilateral removal of the adrenals without substitution therapy prevents the development of hypertension.

The results of all of these investigations apply generally to benign and malignant hypertension. These experiments render it highly probable that diminution of renal blood flow produces hypertension as a result of the secretion of a pressor substance into the blood by the ischæmic kidney.

Weiss and Parker[13] point out that pyelonephritis, by its effect upon the renal circulation, will bring about hypertension; and Herrick[14] states that 22 per cent of patients suffering from pyelitis in pregnancy in the Sloane Maternity Hospital, developed hypertension; and McCann and Romansky[15] raise the question whether ptosis of the kidneys, by producing renal ischæmia, may aggravate an existing hypertension.

The practical bearing of these facts is that the diagnosis of so-called essential hypertension in these days should take account of the possible renal factors in its production, some of which may be remediable.

Search has been made for the source of the hypothetical pressor substance presumed to be present in renal ischæmia. Goormaghtigh,[38, 39] of Ghent, has demonstrated at the vascular pole of the glomerulus a group of cells of special structure resembling smooth muscle. Similar cells are seen in the cutaneous myoarterial glomus and in the carotid body. These groups of cells have been called the "juxta-glomerular apparatus". Goormaghtigh examined these areas in the artificial ischæmic kidneys of animals and found that they had increased in number and size. The possibility that these cells may have a local, or even general, secretory or humoral activity, and thus may have a direct relationship to the hypertensive principle of the ischæmic kidney must be considered.

Sarcoid, or Boeck's disease is not a recently discovered disease, but one may say that its rediscovery is recent, and Palmer[16] has recently given a very complete description of it. Its histological unit is a type of granuloma, and its clinical appearance may be as an x-ray film showing extensive pulmonary disease in a patient who is in good health; it may appear in the eye as a uveitis with parotid swelling; on the skin as an apparent lupus; in the hands, as distorted fingers with cystic areas in the phalanges by x-ray; and in the bowel as the so-called regional ileitis. It is a veritable man-trap for even the most observant clinician.

Though the subject *of congenital lung cysts* has had vague recognition as a clinical curiosity for years, Adamson's[17] article in 1936 brought it forward as a practical problem in thoracic diagnosis. He points out that lung cysts may simulate chronic bilateral pneumothorax, pleural effusion, or diaphragmatic hernia. He reported four cases and reviewed the literature, and found that lung cysts were twice as common in males as in females, and were commonest in the early ages, and that dyspnœa, cough and cyanosis were the commonest symptoms. He pointed out also that pulmonary cysts were fundamentally due to congenital defects, and were commonly associated with other congenital anomalies, and were common in supernumerary lobes. The cysts may be filled with mucus, and these probably develop from buds pinched off from the developing trachea. Most of the cysts, however, are filled with air. Ross and Fullerton[18] comment upon the association between spontaneous pneumothorax and the presence of other congenital anomalies, which suggests the possibility of the spontaneous pneumothorax having a basic congenital origin.

Occidental beri beri with cardiovascular manifestations is the name given by Soma Weiss[19] to the type of heart found in B_1 deficiency. He says that alcohol is, in the west, the chief cause of beri beri, while in the east it is due to polished rice. The cardiovascular symptoms are

closely associated with thiamin deficiency. The evidence is that in such cases (*a*) there is thiamin deficiency in the diet, and (*b*) decreased thiamin content in the urine; (*c*) there is improvement following thiamin administration, and (*d*) production of electrocardiographic changes in healthy men on diet lacking only thiamin chloride; (*e*) induction of cardiac disturbances in animals on a thiamin deficient diet, and (*f*) disappearance of the experimentally induced cardiovascular disturbance after the use of thiamin chloride.

Kaschin-Beck's disease. — An interesting report has been made by Hiyeda[20] of an endemic disease in the Trans-Baikal region and in northern Korea in the mountainous regions among primitive tribes. In build the patients are short, with shortening of the long bones. The shortening is always proportionate, and there is also deformity of the joints. There are attacks of arthritis in the large and small joints in spring and autumn. The disease is active during the growth period from 10 to 18 years of age. It later becomes inactive. X-rays show atrophy of bones, destruction and resorption of joint surfaces, and premature synostosis of the joint cartilages. The disease is not hereditary, and children removed from the area do not contract it. Hiyeda found that the wells in the region contained from 0.6 to 1.0 mg. iron per litre. The blood of healthy Japanese in Manchuria contained 62 mg. of iron per 100 c.c., while blood of patients with the disease contained 70 to 100 mg. per 100 c.c. At necropsy the cortex of the bones was thinned, and the medullary canal dilated, and there was irregular osteogenesis of the epiphysis. Iron pigment was deposited in all the organs. It has been suggested that if these observations are confirmed there may be an upper limit to the medical benefits of iron.

Of considerable interest are the observations of F. G. Young,[21] that by a series of injections of anterior pituitary extract of increasing strength he was able to produce first glycosuria, from which recovery took place, but ultimately a diabetes which persisted after the injections were discontinued. When this stage was reached, he found hydropic degeneration of the islets of Langerhans, similar to that described by Opie 40 years ago in fatal human diabetes, and by Allen in dogs rendered diabetic by partial pancreatectomy. Yet all trace of the causative extract had vanished "as though a storm had passed over the Islands".

A new attitude toward an old disease is reflected in a summary in the *Brit. M. J.* of March 9, 1940, in which it was stated that in England in the week ending February 24, 1940, 586 cases of cerebrospinal fever were reported, which was more than a year's total for 1937, and more than 40 per cent of the year's total for 1928. The unfavourable weather had kept people indoors, and tended toward crowding. The changed attitude was shown first in discouraging the view that carriers and contacts were dangerous people, and, second, in the well-grounded confidence in the ability to cure the disease in a great majority of cases. The Ministry of Health discouraged the search for carriers as a routine practice, believing that a person with a positive swab today may have a negative one tomorrow. Moreover, group 2 meningococcus, the type commonly carried in the pharynx, is usually avirulent. The control of the disease is not a matter of the pursuit of carriers, but of providing three feet of space between beds in sleeping quarters, and of providing good ventilation. Batches of recruits or school children should be kept together, without frequent addition of new entrants to the groups. Local treatment of the pharynx is probably useless. The use of sulphonamide drugs as a preventative is to be discouraged as it prevents effective treatment if the person contracts the disease.

THERAPY

In this year of grace one's mind leaps to chemotherapy and from chemotherapy to the sulphonamide group of drugs. But we must recall that chemotherapy in the forms of mercury, iodine, arsenic, and bismuth has long been employed for syphilis; quinine has been employed for malaria; antimony for bilharzia infections and kala azar. And we all have in mind the careful and valuable work of Maclachlan and his associates on the quinine derivatives, and especially on hydroxyethylapocupreine in pneumonia up to 1937, when sulfanilamide came so dramatically to the fore.

Many look upon the discovery of the antibacterial effects of prontosil as the greatest therapeutic discovery in modern medicine. This took place in 1933. In 1935 Domagk stated that prontosil, a relatively non-toxic red dye, given by mouth to mice inoculated with fatal doses of

hæmolytic streptococci, saved 100 per cent of the animals, but *in vitro* it had no bactericidal effect. For this work he received the Nobel prize. In 1935 an allied product was used in France with favourable effects in erysipelas, and in 1936 Colebrook and Kenny and Buttle in England reported favourable clinical and laboratory results in hæmolytic streptococcus infections. The work was taken up on this side of the water in 1936. In 1938 Whitby, working with the new preparation, aminobenzene sulphoamidopyridine (now called sulfapyridine) on mice inoculated with pneumococci and with hæmolytic streptococci found that it appeared to exert a definite action on the capsule of the pneumococcus and that it was as active as sulfanilamide against hæmolytic streptococci and meningococci, and that it had a low toxicity for animals and did not produce porphyrinuria in those tested. Whitby's work in particular stimulated the adoption and study of the newer drug on this continent. Marshall in pharmacology and Long and his associates in clinical research have greatly clarified our views of this whole group of drugs.

Evans and Gaisford, of Birmingham, England, in *The Lancet,* July 2, 1938, reported a series of 100 cases of pneumonia in the Dudley Road Hospital, Birmingham, treated by the new drug —M.B. 693, named sulfapyridine—in which there was a mortality of 8 per cent as compared with an equal number treated by their colleagues with the routine non-specific methods with a mortality of 27 per cent. It was historic that the group with the mortality of 27 per cent was a composite picture of the old mortalities, and it was prophetic that the 8 per cent mortality under the new drug was identical with the results from its employment the world over, since that time.

Absorption of these drugs is rapid when taken by mouth, and it is largely from the small bowel. The drugs are very diffusible, and concentration in the spinal fluid is almost equal to that in the blood. Though 20 to 40 per cent is acetylated this has little effect upon the drug's efficiency. Given in divided doses daily, concentration is maximum in two days. For the treatment of severe infection a concentration of 10 mg. per 100 c.c. or dosage of 1 gram per 20 lb. of body weight is necessary. Children require 50 per cent more, and infants three times as much as the mg. per kg. dose for adults. Depression, headache and dizziness may occur, and nausea and vomiting are very common, making the patient feel of all men most miserable and causing him to wish he were dead.

Agranulocytosis and hæmolytic jaundice are rare but grave complications, and demand cessation of the drugs, as does the appearance of a skin rash. Fever, usually in the form of a sharp rise after a week's treatment, is another cause for cessation.

Marriott[22] thinks that sulfapyridine is equal or slightly superior to sulfanilamide against the hæmolytic streptococcus, meningococcus, Friedländer's bacillus, *Clostridium welchii,* and *Esch. coli.* It is the most effective drug against the gonococcus, and least effective against the staphylococcus aureus and *Strep. viridans.* It may be of value against *B. typhosus, B. pestis* and *B. influenzæ.* At present it is the drug of choice for any form of fever of uncertain causation which is probably due to bacterial infection.

Kelson and White[23] have reported three cases of *Strep. viridans* subacute bacterial endocarditis, each having at least four positive blood cultures, which were treated by sulfapyridine and heparin. All showed improvement, and at the time of reporting had been free from evidence of the infection for four, eighteen, and nineteen weeks respectively. They state that this method had given more promise than any previously employed against this disease. In Montreal we have found that whereas the method showed promise for a time and the blood became sterile, the disease later went on to a fatal issue.

Swain,[24] of St. Bartholomew's Hospital, says that, since the *Strep. viridans* is not a single species but a heterogeneous group, there is room for variation in its responses to drugs.

The treatment of cerebrospinal fever according to the *Brit. M. J.* of March 9, 1940, is a medical emergency. When suspected on clinical grounds, a full dose of sulfapyridine should be given while awaiting laboratory confirmation. Following this, nine gm. a day for 2½ days, and for another five days the dose should gradually be reduced to zero. In fulminating cases the first two doses should be given intravenously and intramuscularly, one gm. each of the sodium salt. If swallowing is impossible, the drug should be given by the nasal tube. Two to three litres of fluid should be given by mouth or vein. If vomiting persists the drug should be changed to sulfanilamide. There is no clinical evidence of the value of serum when combined with a high dosage of sulfapyridine. There is

little to be said for intrathecal serum and the drug should never be given by this route.

In an epidemic of cerebrospinal fever in Shanghai the cases reported by Jordan, Blakelock and Johnston[26] were divided for treatment into four groups, and the results were

1. With intrathecal serum only—recoveries, 62 per cent.
2. Sulfapyridine alone—recoveries, 68 per cent.
3. Serum intrathecally and sulfapyridine—recoveries, 73 per cent.
4. Intravenous and intramuscular serum with sulfapyridine—recoveries, 80 per cent.

Relapses were rare following sulfapyridine and frequent following serum.

It is interesting that Gross and Cooper[40] found the combination of sulfanilamide and an antiserum intraperitoneally more effective in the pneumococcus meningitis of rats than either alone.

Sulfathiazole is the thiazole analogue of sulfapyridine. Spink and Hansen[27] report upon its use in 128 cases of various infections. In 33 cases of pneumonia it was as effective as sulfapyridine, though the fall in temperature was less abrupt. Fifteen consecutive cases of staphylococcus septicæmia recovered. If these figures are confirmed, it is certainly a chemotherapeutic triumph.

Its use in urinary infections from staphylococcus, *B. proteus,* and hæmolytic streptococcus was very satisfactory. It was readily absorbed and quickly excreted. There was less nausea than with sulfapyridine, but fever and rashes were more frequent. A greater tendency toward blockage of the renal tubules by crystals had been noted.

Finland, Lowell and Strauss[31] gave recently an excellent summary of the present status of pneumonia therapy. They remark on the almost acrobatic celerity with which one development in the treatment of pneumonia has pressed on the heels of another in the following order: Horse serum types I and 2; Felton's refined serum; the break-up of type 4 into thirty odd types; special sera for many of these; simplified Neufeld typing; rabbit serum; sulfanilamide; sulfapyridine and sulfathiazole.

Their conclusions are: (1) For most cases of pneumococcus pneumonia specific sera and sulfapyridine are about equally effective when used separately. (2) For most of the cases with the worst prognosis, the combination of serum and sulfapyridine is more effective than either alone. (3) The best effects of combined therapy in the severest cases are realized only if serum administration is not delayed more than 12 hours after drug therapy is started. (4) Cases in which combined therapy is more effective than drug or serum alone include: (*a*) Bacteriæmic cases over 50 years old, or when treatment was begun late, or when the blood yielded large numbers of pneumococci. (*b*) Cases with more than one lung involved, or patients over 60 who have moderate or severe infections; or in severe cases of type II or III or V of pneumococcus infection; and also when there is evidence of damage by the drug to the red or white cells; when rashes have occurred from the same drug; when jaundice appears; when there is renal impairment; when patients cannot tolerate the drugs well; and finally when, after 24 or 36 hours of active chemotherapy, the drug fails to bring clinical improvement.

It is highly necessary for typing to be done before sulfapyridine has been administered and to have serum available.

Sulfathiazole has shown a potency against the pneumococcus equal to sulfapyridine. It is more soluble—5 g. can be dissolved in a litre of 5 per cent glucose at 90 to 100° C. Nausea and vomiting occur in less than 50 per cent as compared with 66 per cent with sulfapyridine, but drug fever and drug rashes are more common, and crystals in the urine are more frequent.

Two other forms of chemotherapy have reappeared recently. One is the method of rapid treatment of syphilis by the continuous drip method, giving 1 gram of arsphenamine daily in 1,500 c.c. of 5 per cent glucose into the vein at the rate of 30 drops per minute. This procedure is repeated daily for 4 or 5 days, giving in that time the amount of drug usually given in three months. This was carried out at Mount Sinai Hospital by Hyman, Chargin and Liefer[28] five years ago, and the results have recently been published. At the end of the 5-year period 86.6 per cent were well and sero-negative. Polyneuritis occurred in 33 per cent, fever in 60 per cent, toxic rashes in 50 per cent, jaundice (slight) in 6 per cent. One death occurred during treatment, proceded by convulsions; and 14 per cent were failures. A new series of 100 cases has been treated with mepharsen which has proved less toxic, but it is too early to judge the results.

The other chemotherapeutic effort is that with gold salts for rheumatoid arthritis. Many will recall the use of sanocrysin (a gold salt) in

tuberculosis, and its later eclipse. Dawson and Hobby[29] working with mice, found that auro sodium thiomalate—a gold salt, in a single dose of 2 mg. subcutaneously—protected the majority of animals infected with 1,000 lethal doses of a culture of hæmolytic streptococcus (strain C 203 MV). The acute toxic dose of the gold salt is 10 times the effective therapeutic dose.

Hartfell, Garland and Goldie[30] treated 900 cases of rheumatoid disease with gold thiosulphate in doses of 25 to 50 mg. intramuscularly, with a maximum total dose of 1 g.; 42 per cent of these cases showed some toxic reaction, such as skin rashes, stomatitis, albuminuria, hepatitis, aplastic anæmia, and agranulocytosis. Reports from various sources, of improvement in the cases of rheumatoid arthritis, range from 45 to 80 per cent and this includes a drop in the sedimentation rate.

Since agranulocytosis is a hazard in the course of chemotherapy, it is of interest that Jackson and Tighe[32] have recently reported a further group of cases of agranulocytosis, making a total of 85 in all, treated by intramuscular injections of pentose nucleotide, 10 c.c. 4 times a day, with a mortality of 35 per cent, while 75 cases with no specific therapy had a mortality of 78 per cent. Dameshek has doubts of the potency of the specific therapy.

VITAMINS

As we approach this subject we get a whiff of the odour of sanctity and a peep within the veil at what the world has come to think is the mystery of mysteries. Red flannel and goose grease had their day before focal infection was king but now B_1 reigns in his stead. But in spite of the pandemic hysteria about vitamins and the tens of millions of dollars misspent upon them by the public, there are definite values in the same public's recognition that it cannot live on quantity alone, nor upon quantity plus calories alone, and after this fitful fever they shall eat well.

The naming of the vitamins has been simplified—in particular the subgroups of vitamin B—and now we recognize the antineuritic, or beri beri preventive fraction as B_1, which has been synthesized as thiamin.

The pellagra preventive or P.P. factor, synthesized as nicotinic acid; the fraction formerly known as vitamin B_2 and vitamin G, has been called riboflavin, while B_6 has also been synthesized under its own name and that of pyridoxin. Spies and his associates[33] describe a syndrome of extreme nervousness, insomnia, irritability, abdominal pain and difficulty in walking which disappeared after administration of 30 mg. of B_6. Following this, a group of people on adequate diets and another group with clinical evidence of pellagra, beri beri, riboflavin deficiency, and B_6 deficiency were all given 30 mg. of B_6 (pyridoxin). The normal patients excreted in the urine an average of 7.9 mg. of vitamin B_6, while the deficiency group excreted an average of 0.5 mg. Three patients hospitalized and fed a diet deficient in B_6 for three weeks excreted almost none. These results suggest that vitamin B_6 is important in human nutrition, and support the view that clinical deficiency diseases occur, not as single entities, but as complexities.

On account of its phenomenal success in the treatment of hæmorrhagic disease of the newborn, vitamin K has become almost a household word.[41, 42, 43] Its discovery by Dam in 1929; its efficacy in shortening the prothrombin time in infants, and in adults who suffer from liver damage; its synthesis as a naphtho-quinone derivative which may be given hypodermically in a dosage of 1 mg. per day; and the wide gap between its therapeutic and toxic dose have made it a potent instrument in the therapeutic armament.

In the treatment of Addison's disease there have been several advances in recent years. First the recognition of the abnormal electrolyte metabolism and the attempt at its correction by high sodium and diminished potassium intake. Second, the preparation of an active cortical adrenal extract which was life-sustaining. And third,[34] the synthetic preparation of desoxycorticosterone as a readily available hormone substitute. And, finally, the method of subcutaneous implantation by Thorn.[35] The dose averaged 25 mg. daily for 4 days; then 10 to 25 mg. daily for 5 days more, with standard caloric and water intake. The results were retention of salt and water with tendency to œdema and serous effusion; decrease in salt and water output; increase in body fluid and in blood volume; decrease in serum and non-protein nitrogen; and elevation of blood pressure. It was later found that patients did best with small daily doses of the synthetic hormone without addition of salt beyond that in the food.

Thorn and Firor[35] suggest that it is possible to maintain some patients in fair health by

means of sodium chloride therapy alone, but a return to normal activity on this regimen is unlikely. Five mg. desoxycorticosterone in oil daily is a maintenance dose. Thorn formulated the idea of implanting in the subscapular fatty tissue a pellet of 100 to 150 mg. which maintained the patient for a year. Cleghorn, Fowler and Wenzel,[36] of Toronto, report the successful treatment of 9 cases of Addison's disease by desoxycorticosterone, but point out that there is evidence that it is not a complete replacement for cortin.

The second example of a synthetic hormone is stilbœsterol which was produced by Dodds in 1938 under the name of diethyl stilbœsterol. McBryde and others[37] employed it in 36 cases of eunuchoid or menopausal affections in women. There were marked changes in the vaginal smears and subjective improvement. Sixteen per cent had unpleasant effects, chiefly nausea and vomiting, but only two were forced to discontinue the drug. No changes in liver function nor abnormalities in blood or urine appeared. The dose ranged from 1 mg. to 5 mg. daily by mouth. It is approximately as potent as œstrone intramuscularly, and one-third to one-half as potent as œstradiol benzoate.

Of all the advances in medicine in recent years probably the most striking is the change, glacier-like in its imperceptible but powerful movement, away from the segregation of the ills of a patient in individual organs toward the recognition that his ailments are a part of himself, that the man is a part of all that he has met, and that his illness demands that we should, in the words of Canby Robinson, "treat the *patient as a person*".

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RÉSUMÉ

On commence à mieux connaître les virus, leurs dimensions, leur composition chimique, leurs affinités antigéniques, leur éclectisme dans le choix de leur hôte, les conditions de leur virulence, les bizarreries de leur alternance, leur pouvoir immunisant ou leur impuissance à immuniser et leur mode de transmission. Le mécanisme de l'hypertension artérielle est aussi mieux connu. Le

rein ischémique détermine un réflexe hypertenseur ou déclenche un processus humoral également hypertenseur. Les opérations sur le sympathique ne résuisent pas l'hypertension mais la surrénalectomie non compemsée par une médication substitutive prévient l'hypertension. Des recherches sont en cours pour isoler le facteur "presseur" hypothétique. Le sarcoide ou maladie de Boeck est histologiquement un granulôme. Le bérébéri occidental avec troubles cardio-vasculaires est une carence de la vitamine B_1. Le Kaschin est dû à un pourcentage trop élevé du fer sanguin. L'injection d'extrait d'anté-hypophyse peut causer le diabète. Au point de vue thérapeutique, les succès de la sulfanilamide et de la sulfapyridine dans certaines streptococcies dans les méningococcies et les pneumococcies sont bien connus. Le gonocoque est mortellement frappé par cette chémothérapie. L'endocardite maligne bénéficierait de l'association sulfapyridine-héparine. Le sulfathiazole est particulièrement efficace dans les staphylococcies et les pneumococcies. On traite maintenant la syphilis par l'injection continue de Mapharsen très dilué en 4 ou 5 jours. Le rhumatisme chronique déformant bénéficie de l'emploi des sels d'or. L'agranulocytose est heureusement influencée par les injections de pentonucléotide. La vitaminithérapie a fait des acquisitions définitives dans le groupe B complexe et K. L'hormone cortico-surrénalienne, naturelle et synthétique, a changé le pronostic de la maladie d'Addison. Le stilbœstrol serait aussi actil que l'œstrone. En résumé, on commence à tariter le malade comme une personne.

JEAN SAUCIER

WAR WOUNDS*

THE 1940 LECTURE OF THE ROYAL COLLEGE OF SURGEONS OF CANADA

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TO those surgeons whose fortune it has been to serve their country in time of war no question can compare in importance with the progress that may have been made in the treatment of wounds. It seems fitting, therefore, that at this moment, when the first casualties in this new and dreadful war are occurring in our army, this Royal College should review what it has learned in the past and consider what progress can be made in the future.

To attempt to review the whole subject of war wounds in the time allotted to such a lecture would be both futile and dull. The wounds of the brain, the thorax, and the abdomen each call for special study, and each should be dealt with by experts in those particular fields. I shall confine myself, therefore, to general principles that might be applied to most wounds and to the application of these principles to those regions with which I have had the greatest experience.

If you were to ask me what was the greatest single contribution made in the Great War to the treatment of wounds, I would say without hesitation, the "Thomas splint". In the early months the mortality among our troops from shock and sepsis in compound fractures of the femur was appalling, reaching as high as 80 per cent. With the introduction of the splint, and particularly with the introduction of its use in field dressing stations and on the actual field of battle, this gradually fell, until by 1918 some records were as low as 8 per cent. It would, of course, be most misleading to attribute the whole of this improvement to the immobilization and the traction provided by the splint, for many other helpful measures were used as well. Nevertheless, the change brought about by the splint was miraculous, as those can testify who were able to compare the convoys coming into the base hospitals in 1918, with those of three years before.

The great virtue of this splint and of the various modifications of it for both lower and upper extremities was that it provided good immobilization of the fracture, combined with fixed traction which allowed the handling and transportation of the patient without additional pain, shock, or damage to the limb. I draw your attention to it now because in peace time its use has become less general. Its great value, however, has been recognized by the American Red Cross and the St. John's Ambulance Association here in Canada, which have placed it in the equipment of the first-aid stations scattered along all the main motor roads and have included instruction in its application and use in their first-aid manuals.

Of the surgical measures introduced in the great war all will agree the most important was "débridement". With its general adoption came a great reduction in ordinary pyogenic infection and in gas gangrene and tetanus. The general principle involved has been retained in civilian practice and will certainly play an important part in the treatment of the wounds in this war. Success for the method depends on two main factors; first, the time elapsing between the reception of the

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wound and the operation, and, second, the skill of the operator. In order that there may be reasonable hope of preventing infection in the contaminated wound the débridement must be done within six hours of the injury and preferably within four. This was difficult of accomplishment in 1914, but in the present bombing of the cities of Great Britain it is probably quite possible to have the wounded in hospital and operated upon within an hour or two at the latest. This was so in Barcelona and may account in part for the remarkable results obtained there. In the early stages of the bombing attacks on the Catalonian cities elaborate systems of first aid were established but it was soon recognized that minor first aid was not of the importance that had been supposed, but that major measures such as the immediate transfusion of blood for hæmorrhage and shock, the débridment of the wounds, and the ensuring of complete immobilization were necessary if lives were to be saved. The first-aid posts were accordingly abolished and a huge ambulance service established for the immediate transportation of the wounded to hospital.

The skill of the surgeon is of prime importance in the surgery of war, and nowhere is it of such great importance as in the first treatment of the wounded. For the preservation of our soldiers, therefore, we should place in our casuality clearing stations or whatever units correspond to them now in England our brightest, most energetic, and best trained young surgeons, for upon them depend more than on anyone the lives of our wounded. The surgeon must show judgment in selecting for extensive operation those who have a fair chance of recovery, staying his hand in those that must die. He must be capable of both speed and yet meticulous care in excising the edges of the wound, all devitalized muscle, all dirt, all particles of clothing, all bits of loose bone and the projectile, but preserving the main vessels, the nerves and the skin. I am convinced that if this operation is well done the reward will be a great reduction in mortality, and morbidity from tetanus, gas gangrene and pyogenic infection, whereas if it is unskilfully or carelessly carried out it is quite useless.

Throughout the whole of the war of 1914 much study was devoted to the treatment of wounds with antiseptics. Old Army Medical Corps officers will recall the temporary enthusiasms that were aroused by acriflavine, dichloramine T, and sodium hypochlorite, and they will recall that now they are practically unknown in our civilian hospitals. This total lack of interest in them is pretty conclusive proof that they were not of much value.

There were things about them, however, which in the light of modern views, were interesting. For example, I have always believed that there was some slight virtue in B.I.P.P. At first it was thought that by smearing a fresh wound with B.I.P.P. the antiseptic action of the preparation prevented infection. This, of course, is wrong, for B.I.P.P. has practically no antiseptic action. Neither does it appear to have any action on the tissues that could raise their resistance to bacterial invasion. The chances are that whatever virtue it has comes from covering the tissues with an oily film which protects them and provides more thorough drainage of contaminated areas. Certainly, some eminent surgeons think it useful, among whom are Gurd, of Montreal, and Shenstone, of Toronto, and they continue to use it in civilian practice.

The last and best effort to combat actual infection with antiseptics was made by Carrel and Dakin. There is no doubt at all that septic wounds treated by their method, by a trained staff of officers and nurses who omit no details in technique, do well. I doubt that it is the action of the antiseptic solution, however, but rather the aid that the irrigation gives to drainage, that helps the patient. The difficulty with the method was that except in a few experimental stations the details of the method were quite beyond the capability of the personnel and the results were no better than with any other plan of treatment. Except in one or two places, chief of which is the steel plant at Pittsburg, under the surgical direction of Dr. Wm. O'Neill Sherman, the Carrel-Dakin method is not used.

A method which originated in the Canadian Army and came under my observation at its early stage was the so-called "tidal irrigator method" of Taylor. The special apparatus, of which I have a sample here, was known as "Taylor's Tank". The idea of this method was to convert open septic wounds into what were the equivalent of closed wounds, and to submit them alternately to distension with an anti-

septic solution and to negative pressure by syphon. The apparatus is most ingenious, and it always appealed to me as a better aid to washing wounds than any I had seen. If some minor defects in construction have been overcome it will be heard from in this war. I have no notion that any good can come from using antiseptics, but the alternating of positive and negative pressure in the wound may aid in drainage.

One suggestion that at first seemed hopeful was that of Sir Almroth Wright, that the bathing of wounds with hypertonic salt solution might increase the outflow of lymph and so increase the natural defences against the infection. Experience, however, showed that while the discharges from the wound were definitely increased there was little if any effect on the infection. The method is no longer used.

Looking back on the experiences of the last war it would seem that the greatest need is for methods of preventing or of minimizing infection, and, if this cannot be accomplished, of combating it effectively during the first few days. It is because of this that we who were in the Canadian Army Medical Corps in 1918 leap to attention at the suggestion that we are on the verge of discoveries in chemotherapy that will make serious infection of wounds impossible. The suggestion that sulfanilamide or some such compound administered by mouth or by vein, as soon as a wound is received, may so raise the bacteriostatic properties of the blood and lymph that the natural protective agents will be able to destroy the bacteria is so attractive that it demands immediate investigation. I hope that the outbreak of the aerial war in England will lead at once to the establishment of experimental stations where these suggestions can be studied quickly and thoroughly. It should be possible, if a decision in these matters is turned over to men specially trained in the experimental method and who are specially qualified to choose that which is good from that which is indifferent or poor, to establish general policies in treatment and so give our men at the earliest moment the benefit of all that is new.

There is the suggestion also that the immediate introduction of these compounds into the wound may head off infection. A few papers have already appeared, reporting small series of cases, which seem to indicate that under certain conditions the introduction of sulfanilamide powder or a concentrated solution will control bacteria introduced into experimental wounds. If this is so there are all sorts of possibilities, particularly in a war where the wounded can get immediate attention. It is not sufficient that opinion should be based on small groups of patients but in an experimental station it should be possible to take a hundred cases with sulfanilamide alongside a hundred others without it and quickly come to a definite conclusion. It may be that the combination of early débridement with the local application of sulfanilamide, plus its administration by mouth, will be the answer to our prayer for a preventive of infection in wounds.

The question of the time at which infection occurs in contaminated wounds has some points of interest. In the last war one of the most destructive organisms was the *S. hæmolyticus*. Yet it has been stated that cultures taken from war wounds soon after they were inflicted rarely show such streptococci. It is now maintained by Dr. Ronald Hare that such organisms rarely are in the wounds at first and that they cannot be found on the projectiles or clothing of the wounded man. It is suggested that the infection of the wound with pathogenic streptococci occurs later, from virulent organisms sprayed into the air from the throats of doctors, nurses, and other patients, or from other infected wounds. I cannot go into all the experimental evidence that has been advanced to support these ideas, but I must say that it is sufficient to make me think it may be true. Certainly, the technique of wound dressing as it has been carried out in our general civilian hospitals and in the military hospitals in the last war is such as to fill a real bacteriologist with horror. Fortunately, the old dressing tray and ward dressing wagon with its jars of gauze into which everybody dipped, tubes of packing from which strips were cut first for one patient and then for the next, and so on, has been replaced by individual dressing sets, straight from the sterilizer. Let me suggest that those of us who have not recently noted the technique of dressings on our wards do so now, in the light of modern views on the importance of air-borne infection by streptococci.

Interesting as are these and other new plans of treatment, however, they fade into insignificance beside the revolutionary ideas that have come from Barcelona. As a result of these it

would seem that almost everything we have learned about wounds since the days of Lister is about to be abandoned. As the war of 1914 came to be described as "the War of the Thomas Splint", so this one is already being called "the War of Plaster of Paris".

My attention was first drawn to the matter by a communication from Dr. Rudolph Matas, of New Orleans, who spent two months in Barcelona at the end of 1938 while the conflict between the loyalists and nationalist armies was at its height. In his letter he says:

"Let me state from the outset that whatever preconceived notions I had of the treatment of wounds, derived chiefly from the experience of the World War, were completely upset by what I saw in the Catalonian war zone. . . . The fractures of the femur, all compound, often multiple and comminuted, with great lacerations of the soft parts, commanded special attention, not only because of their gravity but as tests of the efficiency of the revolutionary methods of treatment adopted in the Catalonian hospitals in which antiseptics were totally discarded. The Carrel-Dakin treatment had been tried unsuccessfully and abandoned early in the war. With the great crowding of the wounded and inadequate trained help, the method, lacking rigorous application, had proved ineffective, especially since the simplified technique of the occlusive gypsum dressing introduced by Trueta at the Catalonia Hospital, based on the American practice of Winnett Orr, enormously simplified the care of the wounded and yielded better results. The only relic of the World War that remained was the débridement, which was the initial procedure in all cases after hæmorrhage and shock had been attended to. The greatest stress was laid on the excision of all dead, dying, or doubtful tissue, and the reduction and setting of the fractures under the fluoroscopic screen and radiographic control, while the limb was kept in complete extension. Much emphasis was laid on the thorough opening up of the wound and the making of suitable incisions in layers of fascia so as to prevent all possible retention of wound secretions. The wound was then packed with plain sterile gauze or with gauze soaked in vaseline, and finally the limb was immobilized in a skin-fitting plaster spica. The plaster was applied in sheets of gauze wrung out of a plaster cream, not a roller bandage, and placed in direct contact with the skin and wound without any interposed stockinette or padding of any sort. By this procedure the plaster received the discharges from the wound directly and soon became soaked with them and, as everyone knows who has had experience with the Orr treatment, exceedingly foul smelling. In spite of this, however, the plasters were not split or fenestrated or finally removed till three or four weeks had elapsed. Then, after washing off the mush of decomposing pus, sweat, and other matter with soap and water and removing the packs, the wound was found to be quite without signs of inflammation and covered with firm, healthy granulations. This, coupled with the highly satisfactory condition of the patient—no fever, no pain, clean tongue, good appetite—was a revelation which I had not anticipated."

Now, gentlemen, what can all this mean? Is it possible that for all the years of our surgical experience we have been on the wrong track and literally doing our patients harm by unwise interference with their wounds? Is it really possible that by our frequent dressings we have been introducing pathogenic bacteria where none existed, or that we have been preventing natural defences from destroying organisms that were introduced by the projectile? Orr and Trueta think that the débridement gets rid of the risk of tetanus and gas-gangrene by removing dead tissue and letting in the air, and that the thorough drainage of the wound, along with the total immobilization of the part, allows the natural defences to act. The complete covering of the wound with plaster for three or four weeks prevents the introduction of new bacteria and, as Hare has pointed out, may account for the absence of streptococcal infection.

Well, gentlemen, much as I hope that all the claims of Trueta will prove true, I have misgivings that we must not expect too much. There is something about the appearance of the photographs of the plasters that makes me wonder if the results can be just as perfect as the published records seem to suggest. Is it possible that the standards set by these Catalonian surgeons for perfection of results are not so high as ours? I cannot help remembering 500 cases of compound fracture of the femur that passed through my hands on the way home from Rouen and Wimereux, all walking in Thomas calipers, with straight united bones, with not more than an inch of shortening and with good knees and hips, and I for one am not for throwing into the discard methods which produced such results as this without at least an enquiry. Certainly I do not believe for a minute that any skin-fitting plaster applied with the limb drawn out to full length will hold the bones in that position long after the traction is removed. And when it comes to letting these cases up on crutches two weeks after the injury, it seems to me to be sheer nonsense.

On the other hand, I must state that much of what Winnett Orr has said in the past about the occlusive treatment of wounds has been thoroughly proved by experience. The change, for instance, that he has made in the treatment of chronic osteomyelitis is nothing short of phenomenal. Before his papers appeared the common practice was to saucerize the cavities, pack with gauze, and a few days later pull this gauze out with great agony to the patient. The performance was repeated daily, with or without the irrigation of the wound with antiseptics. With the Orr method, on the contrary, the

wound is filled with vaselined gauze and is covered with plaster and not touched again for several weeks, until, indeed, the smell is so bad that something has to be done about it. When the dressing is finally changed the wound is usually found perfectly clean and well on the way to healing. This is a method which has been adopted the world over and is certainly a great advance.

My own experience covers not only the treatment of chronic osteomyelitis but also that of septic ununited fractures. During the war I had under my care fifty of such fractures which under the usual plan would have been treated solely for the osteomyelitis present in the hope that they would ultimately heal up and that after a year or so would respond to a bonegraft operation for the non-union. My experience with these fifty cases resulted in a paper on septic non-union in which we reported the results of a bolder policy, consisting of excision of the septic wound, removal of the sequestrum, reduction of any displacement so that the fragments were in good contact, the packing of the wound with bipped gauze, and the application of a plaster. The surprising outcome was that none of the patients died and nearly all united, so that a satisfactory result was achieved in a fifth of the time required by the old method. When Orr's papers began to appear in 1920, we added to the plan described the packing of the wound with vaselined gauze and covering with plaster and leaving the wound undressed for three or four weeks, until, indeed, the smell became intolerable. The results were undoubtedly surprising. Following a few days of fever, the temperature fell and all general signs of infection disappeared. When the plaster was ultimately removed the wound was found clean, covered with granulation, and well on the way to healing.

Whether this principle will have the same spectacular results in compound fracture, only time will tell. At present, however, the method is being adopted in England with great enthusiasm. In a letter received only a few days ago from one of my young surgical friends in the army, he told me that in his hospital all these terrific air raid wounds are being treated after the Orr method. The details in outline are:

1. Administration of concentrated serum or blood for shock.

2. Thorough washing of the injured part under anæsthesia.

3. Meticulous débridement of the wound and packing with vaseline gauze.

4. Reduction of the fracture on orthopædic table.

5. Application of plaster of Paris directly to the skin. This is laid on in specially shaped sheets wrung out of plaster cream, an operation that does not take more than five minutes.

6. The patient is given sulfanilamide by mouth and the wound is usually dusted with it as well.

7. The administration of toxoid to patients who have had two previous doses, or the administration of prophylactic antitoxin to those who have not.

Faced as we are by the powerful statistics of Trueta, by the long experience and teaching of Orr, by the enthusiasm of Matas, and now by the endorsation of the English and our own young surgeons, it seems like defeatism to apply the wet blanket. Nevertheless, I cannot help commenting on what an amazing thing it would be if it should be shown that we have been mistaken all these years in thinking that washing wounds with antiseptics was a good thing, and if it is proved that it is a better plan to cover them up and let them treat themselves. I cannot help thinking that there must be a great difference between wounds that are infected and those that are only contaminated and have not yet had time to become infected. A thorough débridement of the latter followed by packing and the application of a plaster will probably result in healing by granulation and without serious infection in a high percentage of cases. For such patients the Trueta plan is probably by far the best. For cases, however, that have lain out for hours and are definitely infected when they arrive at hospital, I find the greatest difficulty in believing that covering them up with a skin-fitting plaster can be anything but nonsense. Yet reports are appearing of patients evacuated from Dunkirk who were definitely infected and who did well with the Trueta treatment. I cannot help wondering.

But in spite of any misgivings we may have it would appear that a new idea has been presented to us and as such we should welcome it. As suggested before, these ideas should be thoroughly tested in experimental stations. It

is probably possible now to take two wards of 100 patients each and to treat one on the Trueta plan and the other on, say, the Carrel-Dakin plan and see which is the better. Within a few months, at least, a decision should be possible.

Quite aside from the principle of the occlusive dressing of the wounds, however, something must be said about the principle of maintaining the fragments of the fractured bones in good alignment and full length by a skin-fitting plaster alone. Trueta reduces the fracture by traction and then depends solely on the plaster for the maintenance of position. Our experience with this is that it usually leaves something to be desired and that some shortening is almost a certainty. Standards of excellence, however, must be expected to differ widely in the fracture service of a peace-time general hospital and the casualty stations of cities undergoing an air raid. For the latter I have no doubt the skin-fitting plaster is excellent, as it provides complete immobilization, allows the immediate transportation of the patient to distant bases without additional pain or shock, and it may make all further treatment of the fracture unnecessary. If on arrival at the base the x-ray shows the fragments seriously out of place the plaster can be removed and traction applied. All things considered, if I were over there I would certainly give the plaster a trial.

At a time like this one would like to review all the possibilities of improvement in the treatment of wounds that have developed since the last war. Without a doubt the marvellous advance that has been made, Mr. President, in the surgery of the brain, will show itself in the results of treatment of head injuries. The same is true of the surgery of the chest. It would be impossible, however, even if one were competent to do so, to touch on them in the short time at our disposal. But there is one suggestion, the development of which I have had the opportunity of watching, worthy of a moment's consideration. I refer to the part that heparin may play in rupture of the large arteries. In the battles of the great war when it was usually hours before the wounded were on the operating table of the casualty clearing stations, the chance of doing anything for a severed subclavian or femoral artery was slight. In these air raids on London, however, it will often be possible to get such patients to hospital and do something for them. I was reading in Ambroise Paré a few days ago his instructions given in 1560, that when there is a compound fracture from gunshot, with section of the main artery, amputation should be performed at once. His teaching has stood for four hundred years. I keep wondering if it may not be possible to select some at least from such wounded people and with the aid of heparin to suture the injured artery, or, if too much has been destroyed to allow this, to bridge the gap with a vein graft or a Tuffier's glass tube. The experiments of Dr. Gordon Murray on animals certainly show that this is feasible, and in the half dozen cases of injuries to arteries that have come into hospital in the past year his clinical results have been brilliant. In these the severed artery was trimmed and sewn together with the result that the circulation was permanently restored. Even when glass tubes must be used it seems to me possible, as has been shown in the animals, that the bloodstream may be restored for sufficient time to allow collateral circulation to become sufficiently established to save the limb. These are possibilities which our young surgeons in the C.A.S.F. will have an opportunity to explore.

Gentlemen, we are at the beginning of another terrible war, which from all present signs bids fair to go on for years. The casualties which up to the present have been few may reach enormous figures before we can bring Germany to defeat. What can we do to prepare ourselves to be useful in such an emergency?

The answer is obvious to all who love their country. Those of us who are of military age and physically fit must be ready when the call comes to join up with new units or to relieve our colleagues who joined up with the first call and have already been long enough away. Those of us who are beyond military age or for physical reasons are not acceptable to the army must be prepared to carry heavier burdens here at home, and particularly to train up the students and young graduates so that they will be more useful when their time comes to join the army. With this in mind we are instituting courses in first aid, fractures and traumatic surgery, both for students and interns, and finding the time at the expense of courses that are more suited to civilian life. I was much struck the other night at hearing Colonel

MacFarlane say that there was a great dearth in England of surgeons who understood the use of plaster of Paris. It happens that with us plaster has been long in use and most of the staff are expert at it. There is no reason, therefore, why we should not turn out fifty officers a year who are almost as expert as their teachers. If this is done in all the medical schools of Canada we should have a constant supply of officers who are qualified for the work in hand.

Looking back across the years one cannot fail to be filled with pride at the achievements of the Army Medical Corps in the care of our wounded soldiers. The advance from the American Civil War and even the South African War is enormous. The practical elimination of gas gangrene and tetanus, the introduction of the bone graft, the suture of nerves, the transfer of tendons, the successful repair of wounds of the head, the thorax and abdomen, these are achievements of which our generation of surgeons may well be proud. But just as surgery advanced from 1900 to 1918, so it has advanced from 1918 to 1940, and I venture to predict that when the next ten years are over our successes during the Great War will be getting confused with those of the Crimea. There is one feature, however, in which 1940 must yield the palm to 1914 and that is in the matter of smell. Still, while it is true, as Matas said, that the smell emitted by the patients while their casts were ripening, was somewhat of a shock to sensitive nostrils, nevertheless when he saw them get well with their wounds healed, he realized that "not all cheese that smells bad is bad."

RÉSUMÉ

Si nous revenons à la grande guerre no 1, la plus grande innovation fut sûrement l'attelle de Thomas, tandis que la plus importante mesure chirurgicale fut le débridement des plaies. Le chirurgien de la première ligne doit être vif, habile et judicieux. L'ère des antiseptiques a vécu. La méthode de Dakin-Carrel agit peut-être plus par l'irrigation que par l'antisepsie. Le "tank" de Taylor par ses alternances de pression peut rendre des services. Les bains hypertoniques locaux sont abandonnés. Il est à souhaiter que les dérivés de la sulfanilamide agissent efficacement dans la prévention de l'infection et que cette prophylaxie soit mise à l'étude sur une vaste échelle et entre des mains compétentes; déjà on rapporte des succès avec ces agents. Il est certain que le streptocoque hémolytique n'existe pas dans les plaies toutes récentes, mais qu'il survient plus tard et qu'il est probablement véhiculé par l'air contaminé de l'arrière. L'expérience de la guerre d'Espagne a appris que la meilleure méthode consiste à enfermer la plaie, même au cas de fracture, préalablement débridée et nettoyée, dans un plâtre occlusif pendant 4 semaines. Ce procédé augmente notablement la défense naturelle. C'est la technique de Trueta-Orr. Et cependant, il est difficile de juger cette méthode parfaitement sans faire encore plusieurs enquêtes. En Angleterre on a recours actuellement à la méthode de Orr et on en paraît satisfait; on y ajoute de la sulfanilamide, par la bouche et localement. Les plaies intéressant les gros vaisseaux sont désormais accessibles au traitement, comme, par exemple, les sutures artérielles, grâce à l'adjuvant extraordinaire qu'est l'héparine, Nous devons dès à présent former des jeunes chirurgiens qui soient en mesure de faire leur part de façon excellente lorsque le pays les appellera. JEAN SAUCIER

EMPHYSEMA UNDER FORTY: CLINICAL AND PATHOLOGICAL SIGNIFICANCE*

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AN abnormal depth of thorax in elderly persons is usually regarded as a part of the physiological process of ageing. It is a tentatively satisfying train of thought that such persons are suffering from deterioration of pulmonary capillaries with defective gas exchange, and that this in turn calls for a compensatory persistent increase in the depth of the inspiratory effort. The resulting permanently high or inspiratory position of the anterior ends of the ribs produces the common emphysematous form of thorax, namely, abnormal antero-posterior depth, horizontal position and straightening of the ribs, and limitation of inspiratory movement. Kyphosis may follow, to make the true "barrel chest", presumably from a struggle to attain still greater air space.

When an emphysematous form of thorax is seen however in children or in adults under forty years of age we must think of something further than physiological deterioration. When emphysema under these conditions is associated with obviously severe disease, such as bronchiectasis, asthma, or chronic tuberculosis, this would seem to be sufficiently explained. When, however, as is very often the case, the individual

* From the Mara Laboratories at the Queen Alexandra Sanatorium, London, Ont. Assisted by The National Research Council of Canada.

Courtesy, Staff of Westminster Hospital, London, Ont.

appears well and symptoms are slight or absent an abnormal depth of thorax is apt to be regarded as of no probable consequence, and comes in time to be viewed as falling within the normal range of limits. It comes about that practitioners, and even chest specialists, are not highly conscious of emphysema under these conditions, although it is in fact surprisingly common.

The trend of evidence from accumulating experience is that a beyond-the-usual depth of thorax is a sensitive and significant indicator of antecedent pulmonary injury, and that cultivation of a "deep-chest consciousness" may result in very large clinical and economic returns. Although such an impression has been in this author's mind for some time, it is only with the mobilization of the Canadian Army that more concrete evidence in this respect has become available.

There have of course been many casualties in the military forces due to acute respiratory infections and pneumonias. Military conditions in the present conflict differ sharply from those in civilian practice, in the ease with which frequent radiography is available during and following acute respiratory episodes. Especially different and especially significant is the fact that a presickness chest film is in all cases available under military conditions, since a radiograph of each recruit is made at the time of enlistment. A variety of significant information concerning pulmonary disease has in this way become available, a part of which is incorporated in the present study.

The majority of respiratory acuities which have come to hospitalization in this military district consisted of radiographically visible patchy pneumonia, slight or severe. A lesser number comprised pneumonias of lobar distribution although these were also probably confluent lobular pneumonias. Less often, there were respiratory acuities without visible lesion.

Acute respiratory casualties, whose records were in this way complete, fall for the present purpose into two main groups.

In the first of these groups the symptoms and radiographically visible pneumonia disappeared relatively promptly, that is, in from one to three weeks. Complications and relapse were relatively rare, which may be due to the use of chemotherapy. No abnormal physical or radiographic findings remained on recovery; that is, there was apparently complete anatomical and clinical cure. These persons have also shown no tendency to be respiratory repeaters.

The second of these groups separates itself from the foregoing by conspicuousness of delay in recovery. Cough, pain and dyspnœa, etc., may persist for six to twelve weeks, or become permanent. Relapse and repeat hospitalizations were common. Radiographically, the group showed corresponding slowness of resolution of the visible pneumonia. The group as a class has a final distinguishing feature however, namely, that after the maximum of clinical recovery has occurred radiographic evidence of chronic pulmonary disease or injury usually remained.

Tuberculosis, vascular disease and other gross injury having been previously deleted by routine radiography, the most common residual shadow under these conditions consists of one or more of the following: (1) Thickening or matting of the broncho-vascular markings, either generalized, or confined to one or both bases. (2) Displacement of heart, diaphragm, interlobar fissures, or other landmarks, often with deformity of outline. (3) A pathological degree of localized ring-shadows. (4) Persistence of broncho-pneumonia-like or amorphous-appearing fibrotic shadow.*

Such changes which are variously named chronic infectious basal disease, chronic non-tuberculous disease, chronic post-pneumonic disease or injury, chronic pneumonitis,[2] pulmonectasis,[3] etc. etc., may be of any intensity, from slight to gross. They may or may not be found to be associated with bronchial dilatation if studied with iodized oil, but it is important to know that bronchiectasis may not infrequently be proved to exist when only surprisingly trivial shadow of the kind is present.

We have elsewhere shown that shadows of this kind are probably best explained as being the product of inflammatory reaction and pulmonary traumatism subsequent to pneumonia and patchy atelectasis, whether or not a previous pneumonia or pneumonia-like episode is identifiable.[3] The injury is probably essentially the same in origin and general significance whether or not bronchial dilatation is shown to be present. There is good evidence that "fibrosis", which has long held the rôle of basic damaging agent, is in reality a latecomer in the picture, and that the first cause of deformity of tissue and failure of anatomical "cure" is an ubiquitous patchy atelectasis.[1, 3]

* Reviewed at greater length elsewhere.[1]

In this sense, the too constant use of the term "fibrotic disease" in connection with chronic pulmonary injury may have pernicious tendencies because of persistent misdirection of the train of thought.

At this point it is important to note that unless the disease is of substantial intensity sharpness of image in the film is more essential for its identification than is the case in pulmonary tuberculosis. Failure of sharpness of shadow may itself simulate chronic basal disease, and the reality when it occurs may be thus overlooked. It is also open to question whether fluoroscopically reduced small chest films, though apparently sufficient for tuberculosis surveys, may not miss a disproportionate amount of chronic non-tuberculous basal disease, and an important part of the savings be thus neutralized. As will be shown later, this is probably much more important in military than in civilian or industrial practice.*

It might appear however that what we have been describing is merely incompletely resolved and organizing pneumonia, and as such is common knowledge. A survey, however, of the clinical picture and of the pre-sickness x-ray film reveals another story. In the great majority of pneumonias which fall into this second class of "delayed cure" disease as here described, a survey of the pre-sickness x-ray film shows that part or all of the abnormal basal shadow was present *before* the acute pneumonia occurred. Further, if the thorax is inspected, again in the great majority it will be found that it is abnormal in depth and emphysematous in form. It is clear then, that we are here viewing, not the effects of a fresh accident in a normal chest, but an acute pneumonia superimposed upon antecedent chronic pulmonary injury. It seems fair to assume that the emphysema and radiographically visible injury are related to the parallel tendency to unfavourableness of course and failure of cure; that is, that they are cause and effect. These observations have presumably been slow in coming to light in the civilian population, for the simple reason that a pre-pneumonia x-ray film is rarely available.

Reversing these observations, some significant deductions are warranted.

1. *Method of examination.* — An abnormal depth of thorax or other stigmata of emphysema should be meticulously looked for in all clinical reviews of the thorax; the clinician should become "emphysema conscious". The sign is very common in the elderly and not uncommon in the young. We prefer to examine with the patient standing. The hands should be clasped together in front, with the elbows slightly bent, to rotate the scapulæ outwards and forewards. The shoulders and chin should be "drooped", and the thorax viewed from the side. The decision as to normalcy or otherwise of the depth of the thorax must of course depend upon the experience of the clinician. Once "emphysema-conscious", the decision is not usually difficult. It is our impression that when an injury occurs sufficient to create an emphysema, the reaction is usually sufficiently definite to be more or less obvious if looked for; that is, border-line or difficult decisions are the exception. The observer should resist a tendency to give in to a too superficial impression that a "deepish" chest conforms to the build of the individual, and is therefore not pathological. Hyperresonance to percussion, limitation of thoracic wall and diaphragmatic movements, etc., should also be looked for. We believe however that abnormal depth of thorax is much the most sensitive and positive indicator that pulmonary injury of such extent and quality as to cause significant "space hunger", has occurred. Emphysema, it should be observed, does not admit of precision of identification radiographically, and the onus of recognition is thus to a considerable extent thrust upon the clinician.

2. *Results.*—On the basis of both reason and experience it is probably correct to regard an abnormal depth of thorax as always reflecting a significant past injury. In elderly persons it may be that this is solely the result of vascular deterioration, "normal" or accelerated. It is our experience that such deteriorative changes are quite common after forty-five years of age and not rare in the forty to forty-five group. "Death" perhaps "begins at forty".

In less than elderly persons, an abnormal depth of thorax even when slight, is a mast-high signal that important traumatism may have happened to the lungs, even when clinical corroboration is slight or absent. Radiography is always called for. Tuberculosis, vascular

* The "reduced film" system we understand is being used for examining trainees in the United States, but full sized 14" x 17" films are used for chest radiography for the Canadian Army.

disease, or other major injury may appear as the cause of the emphysema in the entire absence of other clues. More common is the class of shadow here described as indicating chronic infectious basal disease of post-pneumonic origin, with an otherwise silent picture.

3. *Significance.*—Tuberculosis, vascular disease, etc., when revealed as "deep-thorax-cloaked" lesions carry their own clinical implications.

The practical significance of the much more common chronic infectious basal disease when thus revealed is to a much less extent self-evident and common knowledge. The practical importance of this type of injury rests upon an abnormal susceptibility to recurring and protracted respiratory affairs, often pneumonia, with progressive anatomical injury and progressive chronic dysfunction. The practical significance of this prognosis in turn will vary according to circumstances. Thus,

1. The civilian may practise "protection" against recurring illnesses by such measures as avoidance of exposure to infection, sheltered employment, or even selection of climate.

2. If insurance examiners can be taught to become deep-chest conscious and demand radiography where this sign is positive, undoubtedly many less than satisfactory insurance risks can be brought to light.

3. Many recruits have been admitted to the ranks of the Canadian Army (in low categories for home service), having abnormal depth of thorax for their age, and limited radiographic evidence of chronic pulmonary damage. They were accepted for service because neither of these evidences of injury appeared to be sufficient grounds for rejection in the face of good general condition and the non-admission of symptoms. However, as shown above, such persons have selectively become respiratory casualties, with unfavourable course and ultimate discharge from the forces. It is apparent that they are as a class unfit for military service.

Aside from the special undesirability of illness under military conditions, emphysematous persons as here described, are selectively (1) those with a tendency to frequent illness and relapse; (2) those whose illness is apt to become persistent or chronic; (3) those who will form a reservoir from which compensation seekers will undoubtedly come in future years.

A co-ordinated recognition of the deep thorax and the type of radiographic shadow previously described would make possible the recognition and release from service of an important body of frankly bad pulmonary risks. Pneumonia in military forces is thus, within limits, a preventable accident. Vigor of application of the considerations here reviewed may be reasonably expected to produce conservation of military effort, together with immediate and future gains in efficiency and economy that may be second only to those attained by the elimination of tuberculosis.

SUMMARY

Abnormal depth of thorax is a common physical sign in persons under forty years of age. There is a general lack of "consciousness" of this sign among both practitioners and chest specialists because of a superficial appearance of harmlessness. It is shown however that this sign is a highly significant suggestor of important vascular or pulmonary injury, even in the complete absence of correlative clincal evidence. Its special importance lies in the fact that, in the absence of chest radiography, it is frequently the *only* clue to more or less dramatic intrathoracic disease. Its presence invariably calls for radiography.

It is shown that in both civilian and military practice large economic and efficiency gains are possible by an increased recognition of the frequency and significance of this physical sign.

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P. Pribat (*Thèse de Paris*, 1940, No. 168) states that of the complications caused by beauty cures and cosmetic preparations the most serious are those due to hair dyes and decolouring agents. The largest number of cases of dermatitis are caused by tinctures containing aniline derivatives. The dermatitis is due to individual intolerance and in every respect resembles the complications of chemotherapy. Prophylaxis consists in the application of a skin test made from twenty-four to forty-eight hours before the use of the tincture. The complications belong to the group of allergic affections whose pathogenesis is still obscure—Abs. in *Brit. M. J.*

PSYCHOLOGICAL FACTORS IN AVIATION

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I WAS asked the other day whether I was going to prove that the psychological factors in aviation were reducible to one principle, namely, the individual's desire for a "flight from reality", or that flying was merely an "escape mechanism" into the blue. This brought home to me once again how seldom the psychologist's province is ever expected to be what it actually is, and how frequently people are doomed to disappointment in the rather prosaic information which he is actually able to impart. I have therefore altered my title a little so that it epitomizes more closely the kind of information I am able to give you: "In which aspects of aviation can the experimental investigation of the psychologist be of value?" is perhaps nearer the mark.

I.

There are, I am sure, a great many ways of subdividing such a topic, but for my present purposes I have grouped the problems under five headings, which I may outline first, returning to each in detail afterwards.

1. We have what might be called the psycho-physiological studies of high altitudes or in reduced-oxygen chambers. Such studies attempt to answer the question: to what extent is the human organism incapacitated psychologically by these unusual physical conditions and thereby unable to function normally?

2. There is the application to aviation of the broad psychological problem of selecting the right person for a given job. In this case, of course, it involves the selection of the best type of individual to become a pilot, gunner, or observer, or other aviation personnel. Such a task involves a fundamental understanding of the activities which the individual would eventually undertake, and the construction of tests which bear a direct relationship to that activity. Then follow the administration of such tests to the candidates and the evaluation of their respective abilities.

3. There is that province where the pupil learns and the instructor trains, once these "most fit individuals" have been selected. This is, of course, nothing other than the extension of the psychology of learning in general to the specific task in hand. For example, what factors will facilitate this particular learning process? How can we keep track of the type of faults that are being made? How can the estimation of the trainee's progress be most accurately and objectively arrived at?

4. There is that important area outside pure psychomotor aptitude, outside learning ability and mechanical progress, which we may call the estimation of the individual's emotional or nervous stability. In this field the psychologist should bring to bear such tests as will prevent the emotionally unfit from ever embarking on the extensive training and should be able to help in eradicating those pilots who later in the course of training are showing a serious effect of accumulated or sudden strains.

5. The psychologist must try and envisage life as it looks to the aviator. He must be cognizant of the specific difficulties inherent in this particular career. This is where it seems to me that Armstrong,[1] though not a professional psychologist, has made such an important contribution.

To return now to the first mentioned studies, those we have called the psycho-physiological. These are the direct counterpart, the reverse side of the mirror, one might say, of the physiological studies made under similar conditions of reduced oxygen. It is clear, I think, that neither physiological nor psychological studies alone can present the whole picture under these circumstances. For while in the field of vision or audition objective changes may be demonstrated physiologically at high altitudes, only the individual himself can tell you when he ceases to *see* a light or *hear* a sound. Or, again, while it may be demonstrated by physiological techniques, that eye-movements of convergence are slower at high altitudes, only by psychological investigations can it be shown that the individual takes longer to *read* and understand the print his eyes are travelling over. That is, the subjective psychological experience is as important as the objec-

tive measurement of the altered physiological processes.

As an illustration of such psychological studies done under diminished oxygen consumption I have taken those of Ross McFarland.[4, 5, 6] McFarland has worked with both aviators and trained scientists in reduced oxygen chambers, at high altitudes in the Andes, and also on actual high altitude flights, and deserves great credit, I think, for the interest he has awakened in this aspect of aviation. The tests which were used aimed at showing in what way the individual is impaired psychologically under these unusual conditions. All the tests were, of course, given first at sea level to establish norms against which the performances at various altitudes could be compared.

Some of the psychological functions which were measured by McFarland were: simple and choice reaction time, neuro-muscular control, form perception and memory. In addition to this, introspective reports were obtained from the various individuals concerning their experiences.

Some of McFarland's results may be epitomized briefly:

1. Simple sensory and motor responses are not seriously impaired until the subject approaches collapse from lack of oxygen.
2. Choice reactions on the other hand are impaired much sooner, beginning in the neighbourhood of 11.43 per cent (17,000 feet) and gradually getting worse with increased deprivation.
3. Neuromuscular control, as measured by the pursuit meter and Guidit test, is affected before the loss of capacity in more highly organized functions.
4. Higher mental processes are impaired, with a loss of memory, particularly in the estimation of time and attention.
5. There is evidence of irrational or fixed ideas and loss of capacity for "sane judgment and self-criticism".
6. Unusual emotional outbursts may occur.

II.

The contribution of psychology to the selection of pilots was summed up in 1919 in the U.S. Air Service Medical Laboratory Manual as follows: "The function of psychology in respect to the aviator is to study his adaptability to the work required of him". I think that this definition probably still holds good, although the functions tested and the tests themselves undergo considerable modification. In 1919, as quoted by Armstrong,[1] it was felt necessary to test the aviator with regard to the following functions: perception and discrimination, control of voluntary activity, maintenance of equilibrium and orientation, memory, associative thinking, emotional responses, attention, and habit formation and learning. Since, as was seen in the last section, all these functions are to some extent affected at high altitudes it is obviously important that the pilot start with the best possible psychological equipment.

Much of the psychological research at the present time in regard to aviation goes into the construction of better tests which will give as much of the essential information as possible; and, just in so far as these tests are satisfactory there is naturally reluctance on the part of those using them to have them receive publicity. Very generally, it may be said that psychological tests given to pilots before embarking on their training at the present time include tests of general intelligence and those for special flying aptitude. A recent modification of a standard intelligence test which has been used in some places also claims to give information concerning the potentially unstable individual as well as information on general intelligence.

In addition to this test of general intelligence, there are the special tests for air-aptitude of which one may serve as an illustration—the Mashburn Serial Action Test. This test has been described as follows:

"The apparatus roughly simulates the rudder and control stick in a small aeroplane. The signal panel consists of three double rows of parallel lights. In each row of lights a red one appears which is to be matched by a green one by coordinated movement of the controls operated by the hands and feet as in flying an aeroplane. The correct response to a set of signals automatically sets up the succeeding signal until the series is completed. A reactor's score is the total time required to run through a complete series of forty different settings."[7]

It is fairly generally agreed, I think, that the Mashburn Serial Action Test is a particularly good one; that is, the test has a very fair degree of accuracy in predicting a particular type of air-aptitude. For example, figures from Randolph Field indicate that the mean time for completing the test is 5.40 minutes, with a range from 2.50 minutes to 15 minutes. Recently, on examination of 1,713 student pilots it was found that 77 per cent of those who completed the test between 3 and 4 minutes learned to fly successfully, while only 16 per cent of those taking longer than 8 minutes learned to fly.[7]

III.

With the psychological difficulties at high altitudes known, and our potential pilots selected, the next step in psychological investigation is obviously the learning or training periods of the pilots. I may indicate two problems in this field.

What is it that the pilot must learn and how can psychological analysis of the task facilitate his learning? Such a question belongs in what is technically known as "job analysis". Some of you may know the time and motion studies in industry which were an important contribution of industrial psychology in the last decade. In a given job, for example, the performance of the worker is photographed and analyzed in slow motion, so that unnecessary movements are eliminated, and all apparatus and machinery placed so as to afford the individual the maximum comfort and the minimum expenditure of unnecessary energy while he works. Such studies are in progress in aviation, and on the basis of them a "standard flight" is being worked out so that comparable performances between student and student or between student and instructor can be analyzed.

Another aspect of the learning problem pertains to the student-instructor relationship, and a very pertinent investigation has recently opened up in this field under McFarland's guidance. McFarland found that progress was more rapid if instead of a student's ability being criticized and evaluated the discussion centred around the impersonal performance of the plane. For example, the instructor and his student both fly a standard identical course. During the course records are automatically taken in the machine of how the machine is behaving, how it is flying, on both these occasions: then these records are compared.* In the student's flight it can be seen that the ship did so and so. In the instructor's flight it behaved thus and thus. Which is the better? Why? A demonstrable, objective indication of a difference can be seen, and an impersonal assessment of the performances made.

Some very ingenious devices are still under construction, and therefore, I suppose, strictly speaking, are not available for detailed comment, relating to the detection of pilots who during their training are overtense. This seems to be one of the major problems during the training period. For example, there is a stick in use which registers the tightness of the grip. There is a multiple polygraph which measures the tension in numerous muscles. There is even a micro-hygrometer, an instrument which makes possible the obtaining of a continuous record of palmar sweating during actual flight. While it is not possible to discuss these in any great detail, merely to indicate them is sufficient, I think, to let you see along what lines psychological investigations are trending.

IV.

The fourth aspect, that of tests for nervous and emotional stability, is, I believe, the most important of all, although to date it lags behind the others.

It seems pretty generally agreed among authorities that, on the one hand, the pilot's nervous and emotional stability is of prime importance, while on the other hand the existing tests for its estimation are inadequate and actually misleading in some cases.

For example, Group Captain Ryan,[8] asks the question:

> "What extra assets are necessary (other than physical fitness) to ensure that, if accepted, the pilot will continue to carry out his flying duties under all circumstances and conditions". And he answers: "The first asset is nervous stability."

Similarly, Lt.-Comdr. R. Barry Bigelow,[2] writes that in his opinion as many as 90 per cent of the failures in training result from this particular factor, namely, emotional instability. Speaking of the tests in use he says:

> "None of the methods so far considered are primarily directed towards evaluating the *higher levels of integration* to which we refer by such terms as total personality, with its subjective aspects of affectivity, consciousness and volition, and its objective aspects of behaviour. Our studies of morphology, physiology and psychomotor coordination supply us with information concerning the limitations within which the total organism must function, and so serve to eliminate many who are disqualified for flight training, but those methods have thus far not enabled us to predetermine with any accuracy which individual will function sufficiently well within those limitations to perform adequately in military aviation."

What are the tests which are currently used? They are chiefly those of the questionnaire type, amongst them the Bernreuter Personality Inventory, of which some questions are quoted here:

* These "flight-analysers" as they are called, are manufactured by the Impact Register Co., Campaign, Ill., and by Julien P. Friez & Sons, Baltimore, Md.

Yes No ? If you see an accident do you quickly take an active part in giving aid?
Yes No ? Do you get stage fright?
Yes No ? Do you like to bear responsibilities alone?
Yes No ? Have you ever had spells of dizziness?
Yes No ? Do you often experience periods of loneliness?
Yes No ? Do you usually prefer to do your own planning alone rather than with others?
Yes No ? Do you make friends easily?
Yes No ? Do you lack self-confidence?
Yes No ? Are you willing to take a chance alone in a situation of doubtful outcome?

The individual taking the test rates himself in terms of *yes, no,* or *uncertain* (or ?) on 125 such questions.

McFarland,[7] who used this test with 200 pilots, reports that it is "too suggestive and one tends to answer questions in terms of what one believes to be the socially accepted answer". He concludes that it "proved of little value in studying the psychological characteristics of the pilots." Bigelow,[2] also, on the basis of experience with pilots reports "that such tests as the Bernreuter should not be used here as they take the form of questions which the candidate will answer in whatever way he believes most apt to result in his being accepted for the flight training."

On the basis of similar experience with college students I have stated elsewhere:[3]

> "Direct questions to the subject concerning his own feelings, emotions, worries, and psychosomatic sensations give us at best the subject's picture of himself, and may in some cases lend themselves to a frankly false estimate of a person's temperamental qualities."

The other acceptable method of measuring emotional stability, which is advocated by McFarland[7] in place of a better one, is the personal interview. McFarland feels that this is preferable to such tests as the Bernreuter. Armstrong,[1] however, comments that an adequate interview must take between 3 and 4 hours, while Bigelow[2] feels

> "that the difficulties inherent in this method of personality study, (namely, the interview) are much increased in the case of candidates for flight training by a very understandable lack of co-operation on the part of the subject."

He goes on to say that the

> "type of test which would be most useful for this purpose should then be objective, and so designed that the candidate could have no means of knowing what type of response might be acceptable."[2]

Bigelow's solution is the same as that advocated by Harrower-Erickson,[3] namely, that in the *Rorschach method of personality evaluation* we have just such an objective test, for, as the subject takes this test there is

> "no artificial personality ideal to which he can attempt an approximation, while indications of neurotic behaviour or emotional instability are evidenced in ways quite beyond his control or remotest knowledge."

Bigelow states his position in the following summary:

> "it has been found that by analyses of the responses . . . (to the Rorschach test) . . . it is possible to construct an extraordinarily accurate picture of the subject's personality with the tendencies toward stability or imbalance, the strength of its motivating drives, its tendencies to react to stimuli predominantly from within or primarily from outside itself, the efficiency and reliability of the means used to combat, control, or repress instinctive reactions, and many others. Of all these varieties of information available perhaps the most useful for our present purpose may be the evaluation of the degree of emotional reactivity and the methods which have been established to control this. It is obvious that a pilot must not be overwhelmed by either fear or anger in a stressful situation because however excellent his somatic and psychological status he will then be unable to fully use his carefully acquired training and to respond in accordance with it. The same man who made a very high score on serial reaction tests in a quiet room or in the Link Trainer may perform quite inadequately under such circumstances, and probably should not be allowed to place himself, valuable machinery, and perhaps other men in such an impossible situation."
>
> "On the basis of this brief review it seems fair to conclude that we have available or in actual use adequate tests of aptitude for flight training on the somatic, physiological, and psychomotor levels, but that due to the complexity and special difficulties of the problem we have not yet achieved a satisfactory means of psychological evaluation for this purpose. This is the more unfortunate since it is generally agreed that a very high proportion, perhaps approaching 90 per cent, of the failures to complete courses in military aviation are due to causes which fall in this category."[2]

The most recent information allows us to state that the Rorschach method of personality evaluation is now being used in the selection of candidates for training at Pensacola, the United States Navy Air Station. Moreover, a modification of the method, to allow its use with large numbers at the same time, is at present being validated and standardized at the Montreal Neurological Institute.*

V.

I have not gone into Armstrong's contribution in detail, for I think that his book is readily accessible. Further, although an acute psychological observer, he makes no claims to be a professional psychologist. I might, however, close with one quotation which shows his sympathetic understanding and clear-sighted recognition of the stresses and strains inherent in this career.

* This investigation was made possible by the Josiah Macy Foundation, New York City.

"When an individual enters on his career as a pilot he is essentially physically perfect, with a high degree of intelligence, filled with ambition, possessed of great natural courage, fired with enthusiasm, and devoted to duty. The irresponsibility of youth, the pride of accomplishment, the zest of living, and the ignorance of inexperience carry him blithely through the first few years. Gradually, however, as time passes, physical perfection is replaced by physical defect and physiologic change, ambition by apprehension, reckless courage by cool judgment, irresponsibility by responsibility, youth by age, and inexperience by experience; in other words, there has been created a situation in which instinctive desires conflict with social regulation. . . ."

"The many avenues of escape from his situation are naturally obvious to the individual but to this personality type, the price is too high. . . . Thus these individuals are beset with a myriad of profound emotional stresses, some repressed, some clear to the intellect, all capable of producing marked reactions. . . ."[1]

This situation frequently leads to what Armstrong has called aeroneurosis.

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RÉSUMÉ

Cinq facteurs sont à envisager dans l'entraînement aéronautique. 1. Les principales réactions physio-psychologiques à l'altitude ou à la privation d'oxygène sont une augmentation du temps de réaction, une diminution du contrôle neuro-musculaire, l'imprécision de la perception et l'amnésie. 2. Psychologiquement l'aviateur doit s'adapter à sa tâche. Il doit subir avec succès les tests habituels d'intelligence et certaines épreuves spéciales en rapport avec le maniement d'un avion et avec les circonstances propres à l'aviation. 3. Le meilleur moyen de réaliser un bon entraînement consiste à comparer impersonnellement le comportement de l'avion entre les mains de l'instructeur et entre celles de l'élève, puis à souligner les défauts et à suggérer les améliorations à apporter. 4. Des tests, encore imparfaits, de stabilité nerveuse et émotive sont établis, mais une bonne "interview" de 3 à 4 heures paraît préférable. Le test de Rorschach est peut-être encore meilleur. 5. Le psychologue doit envisager la vie comme il le ferait s'il était aviateur avant d'examiner et de classer un candidat.

JEAN SAUCIER

THE INTRACRANIAL USE OF SULPHONAMIDES: EXPERIMENTAL STUDY OF THE HISTOLOGY AND RATE OF ABSORPTION*

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THE sulphonamides when placed in contaminated wounds have been shown by numerous observers to have a beneficial bacteriostatic effect. This histological and chemical study was planned to discover whether these drugs have any unfavourable influence upon the healing of brain wounds when the drugs are introduced at the time of experimental cerebral laceration. Under military conditions it is obvious that so much time must elapse between time of wounding and the time of débridement and suture that dangerous contamination has frequently occurred. Two important questions immediately arise when one considers placing drugs of this group directly into the brain: First: Do they destroy brain tissue, cause any important meningeal reaction, or in any way exercise an undesirable effect on the healing of brain wounds? Second: Does the low degree of solubility of several drugs of this group (especially sulfapyridine) result in encapsulation and indefinite persistence of the drug? And does the use of such drugs increase the likelihood of eventual post-traumatic epilepsy?

To answer these questions, the powdered form of the three most popular drugs of the group at the present time was employed: sulfanilamide, sulfapyridine, and sulfathiazole. About 25 cats were used in the experiments. Operations were carried out under aseptic technique.

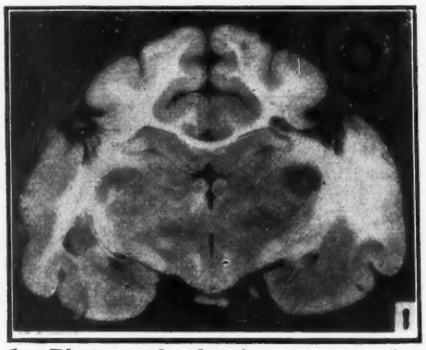

Fig. 1.—Photograph showing nature of operative wounds. Right 7440a; left 7440c.

* From the Department of Neurology and Neurosurgery of McGill University and the Montreal Neurological Institute.

To answer the first question—a cortical excision of 0.5 to 1 cm. in diameter and of a depth to include part of the white matter yet not enter the ventricles was made in each hemisphere, as shown in Fig. 1. The cautery was used only on the pial vessels and always to an equal extent on both hemispheres. In other respects also the wounds were made as nearly alike as possible, *e.g.*, if a silver clip was used on one side one was used on the other, whether necessary or not.

The drugs were inserted into one wound and the other wound was used as a control as is shown in Table I. The area was then covered in most instances with amnion to prevent loss of the drug by washing away into the subarachnoid space, etc. Relatively large amounts of the drug were used (an average of 100 mg.). The dura was finally closed as tightly as possible. There was some deviation from this method in the first few cats operated on, but in every instance conditions were as nearly identical as possible in the two sides of each cat.

The age of the wounds before autopsy as well as the significant histological findings are indicated in Table I. There were collections of polymorphonuclear leukocytes about the meninges in several cats inconsistent with the findings in others. The distribution of these collections and the fact that they were present on the side without the drug as well as on the side with it and remained after the drug was completely absorbed suggested that they were due to the presence of foreign bodies (silver clips and sutures). This was proved conclusively in cats Nos. 141 and 241 in which a silver clip was placed in the wound without the drug but not in the wound containing the drug. In these the leukocyte reaction was seen only about the silver clip.

The accompanying picture illustrates the ap-

TABLE I.

Slide number Days with drug (c): Days without drug (s):	*Drug P=present A=absent*	*Damage to nerve cells (D): Absence of nerve cells (Ab)*	*Leukocytosis*	*Metamorphosis and hypertrophy of microglia*	*Clasmatodendrosis*	*Astrogliosis*	ol= *oligodendrosis* s= *satellitosis*	*Fibrosis*	*Meningeal reaction*
SULFANILAMIDE									
4840B c 4 da.	P	0	plus				s	0	slight
4840A s 4 da.	A	D D	plus				s	0	very slight
5840A s 10 da.	A	D	0	plus	plus	3 plus	0	0	0
5840B c 10 da.	A	0	0	2 plus	plus	3 plus	0	plus	0
5240B s 4 da.	A	Ab Ab	plus				s	0	0
7540A s 64 da.	A	0	plus	plus	0	2 plus	0	plus	plus*
7540B c 64 da.	A	0	plus	plus	0	2 plus	0	plus	plus*
SULFAPYRIDINE									
5040A c 4 da.	P	Ab	0	plus			s and ol.	0	very slight
5040B s 4 da.	A	0	0	plus			s and ol.	0	very slight
6340A s 20 hr.	A	Ab	0	(plus) (0)			ol.	0	plus
6340B c 20 hr.	P	Ab	0	(plus) (0)			ol.	0	2 plus
6240A s 20 da.	A	0	0	plus	0	3 plus	0	plus	0
6240B c 20 da.	P	0	0	plus	0	3 plus	0	plus	plus*
6440A s 33 da.	0	0	0	2 plus	0	3 plus	0	plus	0
6440B c 33 da.	A	D	0	plus	0	3 plus		plus	0
7440A s 68 da.	A	0	0	plus	0	2 plus	0	plus	plus*
7440B c 68 da.	A	0	0	plus	0	2 plus	0	plus	plus*
241A s 12 da.	A	0	0					0	plus*
241B c 13 da.	P	0	0					0	0
SULFATHIAZOLE									
5140A c 4 da.	P	Hæmorrhage							very slight
5140B s 4 da.	A								very slight
5940A s 21 da.	A	0	0	plus	0	3 plus	0	plus	0
5940B c 21 da.	A	0	0	plus	0	3 plus	0	plus	0
6540A s 60 hr.	A		0					0	plus
6540B c 60 hr.	P		0					0	2 plus
7640A s 60 da.	A	0	0	plus	0	2 plus	0	plus	plus*
7640B c 60 da.	A	0	0	plus	0	2 plus	0	plus	plus*
141A c 7 da.	A	0	0					0	0
141B s 7 da.	A	0	0					0	plus*

*These cats showed collection of polymorphonuclear leukocytes about the meninges. For a more complete description see text.

pearance of the wounds macroscopically. Data concerning this picture may be obtained from Table I.

To answer the second of these questions, similar operative procedures were carried out. Known quantities of drugs were inserted in the wounds, as shown in Table II. (In some instances two different drugs were used in a single cat. Cat No. 2613 illustrates the fact that the presence of drug in one hemisphere does not affect the accuracy of analysis of the opposite hemisphere). The wounds were then carefully sealed with amnioplastin and the dura closed as tightly as possible, any bleeding having previously been controlled with silver clips.

The cats were allowed to live for as many days as is indicated in Table II. At autopsy the brain and attached muscle were carefully removed. The two hemispheres were separated and each wound, together with a large area of surrounding cerebrum, was excised and ground with sand.

The method of extraction described by Maher and Camp[1] was used with the following modifications. From 100 to 200 c.c. of alcohol, depending on the amount of drug expected, was

TABLE II.

Cat No. or Control No.	*Amount of drug inserted*	*Days post-operative before autopsy*	*Amount of drug detected*	*Amount of drug absorbed*	*Remarks*
Control No. 1	100 mg. sulfanilamide	0	90 mg.	0	
Control No. 3	10 mg. sulfapyridine	0	9.8 mg.	0	
Control No. 7	no drug	0	less than 1/100 mg.	0	*i.e.*, less drug present than could be detected.
Control No. 8	0.6 mg. sulfanilamide	0	0.5 mg.	0	
Control No. 9	1.4 mg. sulfanilamide	0	1.4 mg.	0	
Cat No. 2593	260 mg. sulfanilamide	26 days	less than 5/100 mg.	260 mg.	*i.e.*, 500 c.c. alcohol used in the extraction and there was less drug present than could be detected.
Cat No. 2597	230 mg. sulfanilamide	30 days	less than 2/100 mg.	230 mg.	*i.e.*, 200 c.c. alcohol used in the extraction and there was less drug present than could be detected.
Cat No. 2615	80 mg. sulfanilamide	25 days	less than 1/100 mg.	80 mg.	etc., as above.
Cat No. 2627	150 mg. sulfanilamide	11 days	less than 1/100 mg.	150 mg.	etc., as above.
Cat No. 2620	140 mg. sulfathiazole	11 days	32 mg.	108 mg.	Figures here may not be entirely accurate for the amount of drug inserted was estimated, not weighed.
Cat No. 2613	80 mg. sulfathiazole	17 days	less than 1/100 mg.	80 mg.	*i.e.*, 100 c.c. alcohol used in the extraction and there was less drug present than could be detected.
Cat No. 2609	80 mg. sulfapyridine	8 days	32.5 mg.	47.5 mg.	
Cat No. 2620	about 110 mg. sulfapyridine	11 days	25 mg.	85 mg.	Figures here may not be entirely accurate for the amount of drug inserted was estimated, not weighed.
Cat No. 2613	70 mg. sulfapyridine	17 days	5.8 mg.	64.2 mg.	
Cat No. 2615	110 mg. sulfapyridine	25 days	2.4 mg.	107.6 mg.	
Cat No. 2616	105 mg. sulfapyridine	34 days	less than 1/100 mg.	105 mg.	*i.e.*, less drug than could be detected.

used instead of 500 c.c. so as to obviate missing very small amounts of drugs. Heat from a 25-watt bulb was applied during maceration to increase the solubility of the drug. Results obtained by use of the colorimeter were checked by the photo-electric cell.

Controls.—The amounts of the drug shown in Table II were ground with fresh cats' brain. Extraction was then carried out as described above. It was also found that in standard solutions the method of analysis used was quantitatively accurate down to 1/10 mg. per cent and qualitatively down to 1/100 mg. per cent.

SUMMARY

1. The drug causes a focal meningeal leukocytic response which soon disappears and is probably of little or no consequence.

2. The drug was seen macroscopically or microscopically as late as 20 days. In some instances it was seen in gross but not microscopically, due no doubt to washing-out during the staining processes. Chemical analysis (experiment No. 2) is more reliable in determining the rate and extent of absorption of various drugs.

3. The drug even while present causes but a minimal focal foreign body reaction. This is much less than what one sees as a result of implantation of silk suture material or silver clips.

4. There is no constant evidence of neuronal destruction or glial reaction resulting from its application to excised wounds of the brain.

5. The ultimate result of the healing of wounds to which these drugs have been applied does not in any way suggest that they increase the extent of scarring or act as carcinogenic substances (coal tars, etc.).

6. The method of extraction and chemical analysis here described is accurate in detecting qualitatively the presence of less than 5/10 mg. of drug in the brain. Smaller amounts than this are probably of no practical importance clinically.

Sulfapyridine is the slowest of the three to be absorbed, but cannot be detected after 34 days.

Sulfathiazole cannot be detected after 17 days.

Sulfanilamide cannot be detected after 11 days.

CONCLUSIONS

Certain characteristics of these drugs must be borne in mind if one is to obtain good results in the prophylactic or active treatment of infection in brain wounds. Of especial importance is the fact that they exercise their effect possibly by inanition of organisms, at any rate in some manner that necessitates a high concentration of drug at the site of infection over a long period of time. Such high concentrations are not contraindicated in the central nervous system. (On a basis of the relative weight of brains the amounts used in the animals would correspond roughly to the use of 5 to 10 grams of the powdered form in the human brain).

Results obtained when sulfanilamide, sulfapyridine or sulfathiazole were applied directly to the brain rule out any contraindications to their use in this manner. Observations reported here should not be construed to include other derivatives of the series, *e.g.*, soludagenan, which because of its high degree of alkalinity is quite caustic.

Sterile sulfathiazole powder was kindly supplied for these experiments by Winthrop Chemical Co.

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THOMAS SPLINT: SIMPLE DEVICE FOR EXTENSION.—Dr. John A. Hayward writes: Various methods suggested in textbooks or correspondence are in use for securing extension in the application of a Thomas splint at the site of casualty. In the absence of skewers to go through a boot, spats, gaiters, or roller bandage to form a clove hitch round the ankle, a very simple device requiring only two triangular bandages will make a quite satisfactory extension with no undue pressure on the foot. (1) Place the centre of a narrow-fold triangular bandage under the concavity above the heel, cross the ends over the front of the ankle somewhat loosely, then wind them round the circle thus formed to make a ring encircling the top of the boot or ankle—a ring pad. (2) Place the centre of a narrow-fold triangular bandage across the sole of the boot immediately in front of the heel, bring the ends up on each side, and draw them through the ring; turn the loose ends downwards, and grasp them together in the right hand to make the necessary extension. The ends are now slipped through the ring of the splint, and the left hand takes up the extension as the splint is slipped upwards. Both hands are now available for tying the ends over the notch on the cross-bar by the usual methods. In first-aid classes I have found that the clove-hitch adjustments are a source of difficulty, and unless very carefully performed cause undue movement of the limb.—*Brit. M. J.*, 1941, **1**: 304.

GLOMUS TUMOURS: CLINICAL PICTURE AND PHYSIOLOGY*

BY J. HAROLD COUCH, M.A., F.R.C.S.

Toronto

THE increasing frequency with which glomus tumours are appearing in medical literature indicates that this strange lesion is fairly common and should be recognized when present.

The normal glomus, as stated by Dr. Blanchard is a peculiar organ combining in its make-up some elements of nerve tissue, vascular tissue, and muscular tissue. The clinical syndrome produced by any disturbance, therefore, presents elements pertaining to all these tissues or systems. In this communication a typical illustration of the clinical picture is presented, with the exception that no tumour was demonstrated. The absence of actual growth is mentioned by other writers and only serves to emphasize the fact that symptoms and signs are so definite as to permit diagnosis of glomus tumour even though no tumour can be seen or felt.

CASE REPORT

The patient, a man of 40 years, complained consistently and bitterly of pain in the 4th left finger nail, which had lasted for three years. The pain was of an agonizing, burning type made worse by the slightest pressure, and yet firm pressure relieved him. Any touch on the side of the nail was so distressing that he trimmed his nail only with difficulty.

In his search for cure the patient had visited doctors all the way from Harley Street to Toronto, and his treatment had ranged from the administration of sedatives, to operation for so-called "ingrown nail". Suggestions as to diagnosis ranged from those which labelled him as a neurotic to those which advocated amputation of the finger.

On examination, there was absolutely nothing to see or feel in the region complained of, no subungual mass, no alteration in nail, no discoloration, as is sometimes described. However, the entire hand was soft, hot, more pink than its fellow, and was so moist with perspiration that the patient constantly resorted to a handkerchief to wipe it off. The slightest pressure against the side of the nail initiated pain, which was so acute that the patient could not prevent himself shrinking even though he was determined not to yield. The pain radiated up the hand and as far, sometimes, as the side of the neck and head. His face perspired more on the same side as the painful finger, and when pain was at its height he showed a moderate Horner's syndrome, with its sunken eye and drooped lid. It was possible, by careful exploration with the tip of a pencil, to locate one point of maximum sensitivity near the base of the nail.

A diagnosis of glomus tumour was made, and at operation the half of the nail overlying the sensitive area was removed. Still no tumour could be found. Therefore, the nail bed corresponding to the removed nail was taken away in one block. Within two hours the patient stated that the severe pain, of which he had complained for three years, was gone and he has remained well ever since that time. Microscopic examination of the tissue removed revealed a glomus tumour. (See pathologist's report in Dr. Blanchard's paper, p. 360).

THE THERMOSTATIC FUNCTION OF GLOMUS

Experts in thermo-dynamics state that the human hand is an almost perfect radiator of heat, due to its thin, flat shape and to the large surface exposed to the air by the skin covering the fingers. The foot is almost as good a radiator if exposed to the air. Glomera appear as normal organs predominantly on hands and feet; rarely are they found elsewhere. The suggestion, therefore, that they function in connection with heat regulations of the body seems logical. Further support is provided for this suggestion by the fact that glomera are found in large numbers in the skin of rabbit's ears, which are known to be the chief organ of heat regulation in these animals.

Physiologists have written much about the active functioning of the capillaries, but have ignored the glomus, in spite of the much more obvious evidence of its neurological and vascular components, and of its ability to function in response to certain environmental factors.

The blanching of fingers which occurs when the hands are exposed to cold is probably a function of the glomera rather than of the capillaries. In an effort to conserve heat the short circuits provided by the multitude of glomera are wide open so that arteriolar blood is shunted to the venules and returned to the body without flowing through the skin capillaries where it would be brought close to the radiating surface. The principle is similar to that of the thermostat in a car which prevents the water from circulating in the radiator core until the engine is warmed or as long as it is desirable to hold heat in the engine.

The activity of the glomera, rather than capillaries, in this connection is further suggested by the severe pain which accompanies marked cooling of the fingers. Every Canadian school boy is familiar with the phase of severe pain which precedes freezing. He knows that as long as his ears and fingers are hurting they are not

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frozen, although they are far past the stage of being merely cold. The intense pain which is so characteristic of glomus tumour is exactly similar in kind.

The helpful effects of sympathectomy for the cold painful extremities of Buerger's disease, Raynaud's disease, and arteriosclerosis may readily be due to a beneficial action on glomera rather than on capillaries. The removal of the sympathetic trunk may result in the glomera being thrown into a constricted or tonic state so that the blood to the extremities is not permitted to short circuit but is forced through the capillaries of the skin, which would obviously result in a feeling of warmth and in improved nutrition of the tips of the fingers and toes where gangrene may formerly have been established or impending. There can be no doubt that the interaction between the sympathetic nervous system and the glomera is more obvious than is any association between the sympathetic nervous system and the capillaries. The very anatomy of the glomera demonstrates always an intimate combination of sympathetic nerve fibres, muscular tissue, and vascular spaces. The Horner's syndrome, which often accompanies glomus tumours on the fingers, cannot fail to remind one of the Horner's syndrome which follows operative interference with the sympathetic nervous system in the region of the stellate ganglion.

Additional evidence of the inter-relationship existing between glomera and the sympathetic nervous system is provided by a study of the disturbed physiology of sweating, which is produced, first, by sympathectomy and, secondly, by glomus tumours. A successful sympathectomy inhibits sweating in the part involved and this phenomenon is admittedly a function of the autonomic nervous system. The disturbed physiology of sweating which is brought about by the presence of a glomus tumour results in the opposite action, namely, profuse sweating, but suggests, nevertheless, a relationship of some sort between glomus tumour and the autonomic nervous system.

Furthermore, since sweating is such an important factor in the control of heat loss of the body, and since the caricature presented by the abnormal glomus suggests a powerful effect on sweating, it does not seem illogical to hypothecate for the normal glomus a function closely associated with loss of heat.

THE PATHOLOGY OF GLOMUS TUMOURS*

BY A. J. BLANCHARD, M.D.

Toronto

IN recent years considerable interest has been centred on the subject of glomus tumours. Although these tumours had been recognized for many years, their essential nature remained obscure. A number of surgeons in the 18th century were apparently familiar with the condition. William Wood,[1] of Edinburgh in 1812 described in detail the clinical picture associated with the tumours and called them "painful subcutaneous tubercles". Later pathological studies are indicated by such names as "Angiosarcoma", "Perithelioma", and "Fibromyomatous angioma" which various investigators applied to them. Modern interest in these tumours dates from 1924 when Masson[2] pointed out their origin from the cutaneous glomus. A recent case has been reported by Nabarro.[3]

NORMAL CUTANEOUS GLOMUS

The cutaneous glomus plays an important rôle in the vascular circulation of the skin. In addition to the usual means by which blood passes from arterioles through the capillary bed to venules there is a second mechanism. This consists of a number of specialized arteriovenous anastomoses through which blood is shunted directly from arterioles to venules without the intermediation of capillaries. These specialized channels constitute the cutaneous glomus and they are scattered diffusely in the deeper layers of the true skin and also under the nails. They are not present in new-born infants but begin to appear a few months after birth, becoming fully developed

* From the Department of Surgical Pathology, Toronto General Hospital, Toronto.

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in young adult life and atrophying with age. The size of the glomus is stated to depend on its location. Those of the pad of the toe measure from 120 to 220 microns in diameter and those of the nail bed from 60 to 150 microns in diameter. Popoff,[4] who has made an extensive study of the cutaneous glomus, found in the great toe of a normal 20-year old adult the following number of glomera: ventral surface 18; lateral surface 10; nail bed 24; and nail matrix 12.

The glomus is a skein or conglomeration of small anastomotic channels which is supplied by an afferent arteriole. This afferent arteriole is in turn a branch of a preterminal cutaneous artery. The anastomotic channels rejoin one another to form a collecting venule. Surrounding the skein and running in between the individual channels is a fibrous reticulum in which are a number of non-myelinated nerve fibres and small capillaries. The anastomotic channels differ from the arteriole from which they arise in that they do not possess an internal elastic lamina. They are lined by a single layer of endothelial cells which may be flattened or cuboidal. External to the endothelium, according to some authors, there is an inner circular and outer longitudinal layer of smooth muscle. Others however, deny the existence of muscle fibres. In this external layer are found the so-called "glomus" cells or "epithelioid" cells (Fig. 1). These peculiar cells are fairly large and have rounded, slightly vesicular, nuclei and rather pale staining cytoplasm. Their cell boundaries are indistinct with ordinary hæmatoxylin and eosin stains, but if Van Gieson's or Masson's trichrome stain be used the boundaries are quite evident. The cells then appear round or polyhedral. The exact nature of these cells still remains obscure. By some authors they are regarded as angioblasts while others consider them to be specialized neuromuscular cells.

The function of the glomera has been studied in detail in recent years. In general it may be stated that they probably have important effects in regulating local skin and general body temperature by means of varying the cutaneous blood flow. It is also suggested that they may have some function with regard to maintenance of blood pressure.

GLOMUS TUMOUR

In the files of the Department of Surgical Pathology of the Toronto General Hospital are four cases of glomus tumour which, strange to say, all occurred within a period of several months. One of these cases is being reported in detail by Dr. J. H. Couch,[5] and accordingly will be presented here only in abstract. In addition to these four cases a fifth case in which multiple glomus tumours were present on one digit was studied, and this case will be reported by Dr. Burns Plewes.[6]

Although reports in the literature indicate a higher incidence in females, all of these tumours occurred in males, the youngest being 15 years and the oldest 80 years.

CASE 1

A male, aged 80, had noticed a painful tender swelling in the region of the right external malleolus of the ankle for one year. He stated that the pain was initiated by even as slight pressure as that of a stocking. The tumour was removed locally, and since then the patient has been symptom-free with no evidence of recurrence. The tumour was quite large, measuring 2 x 1 x 1 cm. It was encapsulated and of a reddish yellow colour. On microscopic examination it was found to be a glomus tumour.

CASE 2

This 43-year old male stated that while receiving a hypodermic injection 18 years previously the needle had broken off in his arm. Although the needle was removed, there had been a rather persistent aching pain at the local site ever since. Lately, however, this pain had become more severe and was accentuated by slight pressure. On examination there was a tender lump the size of a pea on the left upper arm and immediately above this was a fluctuant purplish mass. On aspiration, pure blood was obtained and a clinical diagnosis of hæmangioma was made. The tumour was excised locally. This patient failed to return to the Out-door Department, and so the end-result in this case is not known. The pathological diagnosis was glomus tumour.

CASE 3

This 41-year old male had noticed a painful subcutaneous nodule on the outer side of the left patella for 2½ years. The lump was quite tender and about 1 cm. in diameter. Local removal completely eliminated the symptoms. This tumour also was a typical glomus tumour.

CASE 4

This tumour occurred under the finger nail of a 40-year old male. Clinically it presented a problem in diagnosis which is discussed by Dr. Couch. On pathological examination it was found to be a glomus tumour.

PATHOLOGY

The glomus tumour may be regarded as a benign overgrowth of the normal cutaneous glomus. It reproduces the histological picture of the normal glomus, showing an increased number of vascular channels and a corresponding hyperplasia of glomus cells. The tumours

are single, but they may be multiple, and may occur anywhere in the skin. There is a marked tendency for them to arise in the extremities and particularly under the nails. They appear as rounded or oval small masses usually of pinkish or purple colour, and range in size from 2 mm. in diameter up to that of a Lima bean.

In studying our four cases and the multiple tumours described elsewhere by Dr. Plewes, it is seen that they all possess certain features in common, although there may be fairly marked individual differences. The tumours are surrounded by a fairly definite collagenous capsule, and are composed of a network of vascular channels simulating those described above in the normal glomus. These channels are lined by a single layer of flattened or slightly swollen endothelial cells, and external to this layer can be seen a varying number of glomus cells (Fig. 2). Some of the vascular channels have a zone of collagenous fibres separating the endothelium from the glomus cells. In some tumours the number of glomus cells is rather small, and the tumours may have an appearance suggesting hæmangioma. In other cases the glomus cells are present in large numbers, and may even grow in dense compact sheets suggesting an epithelial tumour. In these

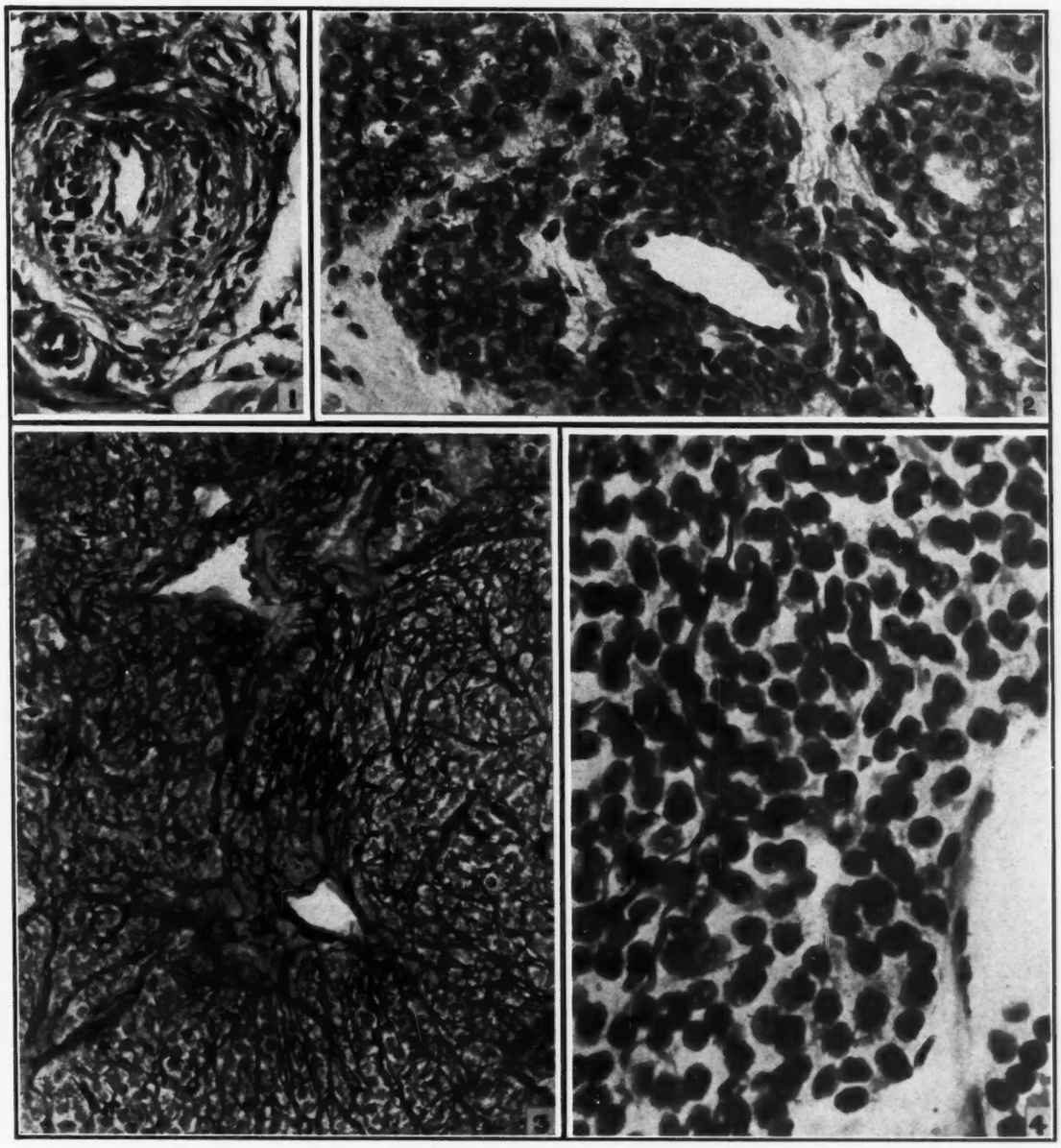

Fig. 1.—Normal cutaneous glomus of skin of finger; hæmatoxylin and eosin (x225). **Fig. 2.**—Glomus tumour. Note the similarity to the normal glomus and the increased size of the glomus cells; hæmatoxylin and eosin (x225). **Fig. 3.**—Glomus tumour showing reticulum; Hortega's reticulum stain (x225). **Fig. 4.**—Glomus tumour showing nerve fibres; Gros-Bielschowski method (x510).

latter cases, however, areas are present where the resemblance to the normal glomus is quite evident. The glomus cells as seen in the tumours are similar to those described above in the normal cutaneous glomus but as a rule they tend to be larger. The tumour cells have round or oval, slightly vesicular, nuclei and an abundant pale or slightly eosinophilic cytoplasm. The cell boundaries are clearly outlined by Van Gieson's or Masson's method, and the cells then have a rounded or polyhedral shape. In our cases there appeared to be no smooth muscle elements in the tumours. There may be considerable mucoid degeneration in the masses of tumour cells.

In the literature on the subject reference is made to the large numbers of nerve fibres which are said to be in the capsule and in the tumour proper. Through the kindness of Dr. Margaret Thompson one of the tumours was studied in detail with this in mind.

Formalin fixed material was used and frozen sections were cut and stained with the Gros-Bielschowski method, the Da Fano modification of the Bielschowski, and the reticulum stains of Hortega and Perdrau. The principle of all of these stains is essentially silver impregnation of fibres. The results obtained have been rather confusing. With the Da Fano technique, which is supposed to stain nerve fibres, and with the Hortega and Perdrau techniques which are considered specific for reticulum an essentially similar picture was obtained (Fig. 3). This consists of a tremendous network of finely branching argentophilic fibres which extends out in a branching radial manner from the vascular channels and penetrates in between the glomus cells. The collagenous fibres of the capsule are outlined as well. Some of these argentophilic fibres have bulbous extremities and some even appear to end in glomus cells. Many of these fibres, however, do not have the appearance typical of nerve fibres, and they appear to be present in too great numbers. A similar picture can be obtained with the Van Gieson stain. It is felt that the majority of these silver impregnated fibres are not nerve fibres but merely the reticulum of the tumour. By means of the Gros-Bielschowski method a rather different appearance is obtained however. The capsule is almost unstained with the exception of a few nuclei of fibroblasts and occasional small thin, elongated fibres which are considered to be nerve fibres. In the tumour proper the dense reticulum is not evident, but a number of fine argentophilic fibrils can be seen running in the loose connective tissue about the vascular channels and also extending in among the tumour cells (Fig. 4). Many of these fibres have finely branched endings, whereas others terminate in bulbous extremities. Some appear to terminate in tumour cells and others end blindly in the interstitial tissue. These fibres demonstrated by this latter method are considered to be nerve fibres in all probability. A Smith and Quigley stain, which is specific for myelin sheaths, gave a negative result, and accordingly the nerve fibres are thought to be non-myelinated.

ETIOLOGY AND PROGNOSIS

In reports in the literature many of the tumours are preceded by a history of trauma as is the second one cited above. This is the only etiological factor recognized, and it is not present in the majority of cases. The tumours are essentially benign and local excision will give a permanent cure.

SUMMARY

The structure and function of the normal cutaneous glomus has been reviewed, and the essential benign nature of the glomus tumour has been indicated. Structurally, the glomus tumour consists of a network of endothelium-lined vascular channels surrounded by 'glomus' or 'epithelioid' cells which are supported by a fine collagenous reticulum. The tumours are encapsulated, and in the capsule as well as in the tumour proper are a number of non-myelinated nerve fibres which can best be demonstrated by the Gros-Bielschowski method.

The writer's thanks are tendered to Prof. W. L. Robinson for permission to publish these cases and for valuable suggestions in the preparation of the paper, and also to Prof. E. A. Linell for assistance in interpreting the special stains.

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That the potato is a good substitute for bread as an energy food, but that the protein and mineral salts it provides, with the exception of potash, are less than would be derived from bread, was mentioned in the course of a recent discussion held by the nutrition panel of the Society of Chemical Industry. The potato can act as a satisfactory source of protein for periods up to 300 days in spite of the fact only 50 per cent of the nitrogen-containing substances in this vegetable are protein in nature. Although the vitamin C content of the potato is relatively low, it is quite an important anti-scorbutic food by reason of the fact that most people eat a fairly substantial quantity every day. The content of vitamin B_1 is of the same order in the potato as it is in bread, and the content of vitamin B_2 compares with that of meat and fish. These vitamins may be partially or completely lost during cooking, according to the method employed. Steaming causes the least destruction of vitamin C.—*J. Roy. Inst. Pub. Health & Hygiene*, 1940, **3:** 299.

PRIMARY CARCINOMA OF THE URETER

BY FREDERICK PILCHER AND D. S. MACNAB

Calgary

THE ureter is one of the rarest locations for primary carcinoma. The large number of case reports in recent years suggests that carcinoma of the ureter is being recognized more frequently with modern diagnostic methods which were not widely available nor extensively used twenty-five or more years ago. It is probable that about 1 per cent of carcinoma of the upper urinary tract originate in the ureter.

The first case of primary carcinoma of the ureter was described by Rayer[14] in 1841. The tumour was discovered at autopsy and the diagnosis was based on gross rather than microscopic examination. In 1878 Wising and Blix[18] reported the first case which was complete with microscopic diagnosis. More recently very thorough reviews of the literature,[1, 11, 15, 16] have been made. The most recent is by Foord and Ferrier,[4] in which the total number of cases of primary carcinoma of the ureter is brought to 139. There is some difference of opinion as to what constitutes a benign and what constitutes a malignant tumour of the ureter. This makes it difficult to evaluate the various statistical studies in regard to the incidence of primary carcinoma. In addition to the cases tabulated by these authors we have been able to find additional 15 cases,[2, 3, 5, 6, 7, 8, 9, 10, 12, 13] which, together with the case herein reviewed, bring the total up to at least 155 cases.

CASE REPORT

Mr. A.W.B., aged 56, was referred to the Calgary Associate Clinic on March 9, 1938, on account of hæmaturia. Approximately six weeks previously he had developed a pain in the right loin and right side of the abdomen, which was accompanied by leucocytosis and normal urine. It was thought that he had appendicitis and the appendix was removed. Urinalysis during convalescence was negative. About four weeks after the appendix operation his pain recurred, and this time it was accompanied by gross hæmaturia. An excretory urogram showed no dye in the right kidney and the patient was sent to Calgary for further examination.

Fig. 1

Fig. 2

Fig. 3

Fig. 1.—Excretory urogram showing a normal left kidney but with no dye appearing on the right. **Fig. 2.**—Ureterogram showing a filling defect which might be a primary tumour of the ureter. **Fig. 3.**—Entire right ureter and circular piece of bladder wall and mucosa surrounding the ureteral orifice removed after operation for removal of the right kidney.

An excretory urogram (Fig. 1) made by us on March 9, 1938, showed a normal left kidney and no dye appeared on the right in any of the films. Cystoscopy in the office showed a small tumour projecting from the right ureteral orifice. The patient was sent to the hospital, where cystoscopy was repeated under sacral block anæsthesia on the following day. The tumour protruding from the right ureteral orifice was removed with forceps. A catheter was then passed up the right ureter

and met with an impassable obstruction about 4 cm. from the ureteral orifice. Dye was injected and an ureterogram made (Fig. 2). This showed a filling defect which was thought to be either a primary tumour of the ureter, or an extension down the ureter of a primary tumour of the renal pelvis.

On March 12, 1938, under spinal anæsthesia, the right kidney was exposed through the usual flank incision. It was found to be a thin shell filled with about 900 c.c. of urine and old blood. The ureter was tremendously dilated. Palpation of the ureter showed a tumour mass in the ureter at about the brim of the pelvis. The ureter was clamped, cut, and ligated above this mass and the kidney removed. Unfortunately the specimen was lost later, and a photograph is not available. The kidney was a mere hydronephrotic shell and the mucosa of the pelvis and upper ureter was entirely free from tumour. Convalescence was uneventful.

On March 25, 1938, under spinal anæsthesia, the right ureter was exposed extraperitoneally through a Gibson incision. The entire ureter was removed and with it a circular piece of bladder wall and mucosa surrounding the ureteral orifice about 3 cm. in diameter (Fig. 3). The opening in the bladder was closed in two layers and a catheter placed in the urethra for drainage. Convalescence was uneventful. Microscopic examination of the tumour was made by Dr. A. C. Broders who reported it a grade-2 carcinoma.

Follow-up cystoscopy on August 6, 1938, and January 19, 1939, showed no tumour in the bladder. On November 20, 1939, cystoscopy revealed two small papillomas in the base and posterior wall of the bladder. These were destroyed in the office by electrocoagulation. Cystoscopy again on May 20, 1940, showed no further recurrence and abdominal examination revealed no suspicion of metastases.

According to the literature the average age for primary tumours of the ureter is about fifty-five years. Most of the cases occur in the fifth, sixth, and seventh decades. Cases are reported in persons as young as the early thirties. The distribution between the two sexes is about equal.

Symptoms.—The outstanding symptoms are hæmaturia, pain, and tumour. According to Foord and Ferrier[4] blood was noted in at least 70 per cent of the patients. Pain was present in 60 per cent and varied in duration from a few weeks to several years. The pain is usually a dull ache in the kidney region, or a typical colicky ureteral pain. The pain due to local invasion or metastases depends on the structure involved. The character of the urine will depend on whether the tumour is bleeding at the time of examination, and whether infection has taken place. Infection generally occurs sooner or later in the majority of cases, and accordingly may alter the clinical picture. The tumour mass noted is generally the hydronephrotic kidney; very rarely has the ureteral tumour itself been palpated.

Diagnosis.—There is only one pathognomonic sign of ureteral tumour and that is the demonstration of a filling defect in the ureterogram. The difficulty of demonstrating such a filling defect is very great, less than 10 per cent of the reported cases having this positive evidence. Actually, very few of the earlier reported cases were diagnosed before operation, but the incidence of preoperative diagnoses has increased considerably in those reported later. Cystoscopic examination may show a bloody spurt from the affected side. In about a third of the cases a tumour may be seen projecting from the ureteral orifice. The appearance time and concentration of indigo carmine from the affected side will depend on the degree of ureteral obstruction produced by the tumour. Obstruction to the passage of a catheter in a ureter from which bleeding occurs is very suggestive of tumour. In probably half of the cases there is a complete ureteral block and no bougie or catheter will pass the tumour.

The plain x-ray, or scout, film may show an enlarged kidney shadow due to the associated hydronephrosis. Coincidental stones might be observed. The excretory urogram usually shows no excretion of dye on the affected side because of the interference of kidney function by the obstructing growth. A hydronephrotic or even normal kidney may show on the affected side. Rarely does the excretory urogram show the filling defect in the ureter. A catheter must be passed, or at least its tip engaged in the ureteral orifice, so that the ureter might be filled sufficiently to show the defect. The filling defect should be constant in repeated films, in order to avoid error due to blood clot or non-opaque stone.

It is possible to have a tumour so small that it cannot be demonstrated. For other reasons the tumour might be overlooked. If the kidney has been removed because of hæmaturia and it does not show adequate cause for the hæmaturia, then the ureter should be removed. If bleeding occurs from the stump of the ureter after nephrectomy the entire ureter had better be removed.

Pathology.—About two-thirds of the primary ureteral tumours occur in the lower third of the ureter. Only a very few occur in the upper third. Ureteral tumours originate from a type of epithelium similar to bladder epithelium, and the general character of these resembles that of bladder tumours in microscopic appearance as well as in the clinical course of the disease. There are marked differences in the terminology used by different authors, and

nearly every pathologist has a different system for classifying and grading the degree of malignancy in ureteral tumours. Bladder tumours, considered by many as benign papillomas, are thought by others to possess a low degree of malignancy. For that reason all primary ureteral tumours probably should be considered malignant. Primary ureteral tumours show the same histological character and degrees of malignancy as do bladder tumours. Because of the large percentage of cases showing metastases at operation or autopsy and because of the very poor end-results this is at least suggestive that ureteral tumours possess on the average a higher degree of malignancy than bladder tumours. Of course, the relatively late diagnosis in many cases may be responsible for the poor ultimate results.

Prognosis.—A large majority of those who survive the operation die within two years, generally with local recurrence or metastases. Scott[17] made a careful follow-up study of the cases in the literature and found only two patients alive after five years.

Treatment.—The accepted treatment is nephro-ureterectomy, with the removal of a portion of the entire bladder wall where the ureter goes through the bladder. The operation may be done in one or two stages. Foord and Ferrier[4] report a mortality rate of 40 per cent in one-stage nephro-ureterectomies and only 5 per cent in two-stage nephro-ureterectomies. In our case the kidney was removed first and the ureter later, but it has been suggested by Dr. Hugh Cabot that the lower segment of the ureter containing the tumour together with a cuff of bladder mucosa should be removed first and the upper end of the ureter brought out to the skin, as with cutaneous ureterostomy. Later the kidney may be removed with the attached portion of the ureter. If the ureter is removed first then the source of danger is removed, whereas if the kidney is removed first, some unforeseen complication may delay indefinitely, removal of the lower segment of the ureter containing the tumour. Pre-operative and post-operative radiation are probably of considerable value.

Every patient who has an ureteral tumour should have regular routine follow-up cystoscopies, as is done ordinarily in cases of bladder tumour. The same etiological agent which was responsible for the tumour in the ureteral mucosa may later cause one in the histologically similar bladder mucosa. Frequent cystoscopies will disclose such tumours when they are small and can be destroyed satisfactorily by cystoscopic fulguration.

SUMMARY

The literature of primary carcinoma of the ureter is reviewed thoroughly, and a personal case is given in detail.

The chief symptoms are hæmaturia, pain, and mass.

The only pathognomonic sign is a filling-defect in the ureterogram. Suspicion of primary ureteral tumour is aroused by unexplained bleeding from an ureteral stump, or impassable obstruction to a catheter in a ureter from which bleeding occurs. In about a third of the cases a tumour projects from the ureteral orifice.

Ureteral tumours resemble bladder tumours histologically and in their clinical course. All ureteral tumours should be considered malignant.

The treatment of primary carcinoma of the ureter is complete nephro-ureterectomy, preferably done in two stages, with removal of the lower tumour-containing ureteral segment first, followed later by removal of the kidney.

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MULTIPLE GLOMUS TUMOURS: FOUR IN ONE FINGER TIP

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NEURO-MYO-ARTERIAL glomus tumour is a rarity, reports in the literature totalling less than 100 cases. More than one tumour of this type in one patient is still less frequent, only 5 such cases being found.

Four glomus tumours in one forearm was reported by Adair[1] in 1934. Stout's[2] series of glomus tumours included a case with two tumours around the heel of one patient, and another who had a second tumour removed from the fifth finger eight years after the removal of the first and relief of symptoms. Bergstrand[3] observed and operated upon two cases of multiple glomic tumours involving the postero-lateral aspect of the foot and malleolar region. One of these had obtained only partial relief by undergoing in succession periarterial sympathectomy and ramisection, but was completely relieved by two operations for the removal of six tumours. The other patient had four tumours involving the bones of the posterior foot so that the radiographic pictures suggested multilocular cysts. These cases were so similar that Bergstrand suggested that they might be examples of a distinct clinical entity.

None of the reports showed evidence that multiplicity of the glomus tumour gave rise to any peculiarly different or more severe symptoms. Nor has any clinical or pathological evidence of malignancy been demonstrated. It is suggested that the rare case of recurrence may well have been a case of multiple glomus tumours, the second tumour being very small at the time of the first operation.

Many of the characteristics of glomus tumours are illustrated by the following case. It represents the first definite case of multiple glomus tumours of the finger (the most common site for single tumours) which the author has been able to find recorded.

CASE REPORT

The patient, a youth of 16 years, had spent his childhood in the Orient, his parents being Canadians of British origin. The only previous illnesses were asthmatic attacks, probably due to allergy, when a baby.

As early as ten years ago the patient had complained of pain in the little finger of the right hand when bathing in cold sea water. For about seven years there had been pain and tenderness in the tip of this digit. For five years, atrophy, intermittent discoloration, and excessive sweating of the whole finger had been noticeable. During the past two years he and others had been able to palpate a lump in the palmar aspect of the finger tip, such palpation bringing on severe prolonged pain. He thought his trouble was related to a slight accident when he had cut the base of this finger with glass. The appearance of a lump was interpreted as the migration of a bit of glass from the site of the old, half-forgotten scratch. But many examinations by doctors had failed to reveal any tumour previous to this time. X-ray plates, taken a year before, failed to reveal any abnormality or foreign body. Pain radiating from the finger tip up the forearm to the elbow was brought on by striking or palpating the pulp of the finger tip, by vibration (as by riding his bicycle with his hand firmly on the grip), or by changes in temperature. Immersion in cold water, winter weather, and occasionally hot water, would also bring on attacks of gradual onset which were so severe that the pain would spread "like a chilly sickness" over his whole body and sometimes make him "yelp with pain". It would take from half an hour to half a day for him to recover from a severe pain. The patient was abnormally careful to wear lined gloves or mitts. The tenderness became a greater problem recently when he began to take an interest in playing the piano, for though he could hit the keys with the affected finger, touching the side of the adjacent key might cause sharp pain. He found no relief except in the protection of his finger from contacts, blows and changes in temperature.

Examination.—No abnormalities were found in this well-developed intelligent youth except those of the right fifth finger. The latter was definitely smaller and thinner than its fellow of the left hand. The skin was dusky, almost cyanosed. Beads of sweat were noted on its palmar surface but not on the other fingers. On the ulnar aspect near the tip a tiny elevated darker reddened spot formed a round elevation of smooth skin. This varied in colour from time to time, sometimes appearing almost transparent. Pressure over this little lump caused very severe pain which did not radiate. A larger tumour could be palpated, but not seen, in the midline of the finger in front of the middle of the terminal phalanx, and was nearly half a centimetre in diameter. Pressure over this firm lump brought on severe pain radiating up to the elbow and a generalized feeling of sickness and faintness. A diagnosis of neuro-myo-arterial glomus tumour was made and operative removal advised.

Operation.—Toronto East General Hospital, April 13, 1940. With novocaine finger block and tourniquet, a longitudinal ellipse of skin was removed from the ulnar aspect of the finger so as to include the small visible tumour. The palmar margin of this wound was then retracted toward the larger midline mass. As dissection proceeded a very small, but distinct, encapsulated, pale, grayish, rubbery hard tumour was found and removed. It was too small to have been palpable. The larger midline tumour was then exposed and had the same appearance. A leash of tiny blood vessels formed a pedicle which was ligated before it was easily removed. Having thus found three tumours, further palpation revealed a fourth beside the ulnar aspect of the root of the finger-nail. This was about 3 mm. in diameter, encapsulated and with a pedicle. The tourniquet was removed and profuse bleeding, probably from the pedicle of the tumour removed with the skin, controlled. The skin was closed with fine silk.

Progress.—The wound healed satisfactorily. In nine days, when the stitches were taken out, there was still marked local tenderness. Improvement since then has been steady though four months after operation there are still a few modified signs and symptoms present. The patient says he is still definitely improving. The discoloration has gone, but the finger looks small and atrophied, and sweats more than the rest of the hand. Under ordinary circumstances of using the finger and immersion in cold water there is now no pain. Riding his bicycle is not now a cause of pain. But intentional pressure by palpation over the proximal end of the scar still causes slight local pain and a perceptible "sickness in the stomach" which may last three minutes.

Pathological report (Dr. G. F. Laughlen).—The specimen consists of three spherical nodules, 4 mm., 3 mm. and 1.5 mm. in diameter, and a segment of skin and subcutaneous tissue, 1.5 mm. thick. In the subcutaneous tissue is a tiny nodule measuring less than 1 mm. in diameter. All four tumours present similar characteristics: encapsulated, of medium firm rather elastic consistency, pale yellowish brown in colour both on their outer and cut surfaces.

Microscopically, tumour cells are arranged in clusters separated by bands of connective tissue and vascular spaces, which are large and prominent. The tumour cells are spheroidal in shape, somewhat larger than polymorphonuclear leukocytes, have acidophilic cytoplasm, and their nuclei are large and often reticulated. Connective-tissue cells are sometimes dense and fibrillar, sometimes myxomatous. All four of the tumours are similar in structure and lie below the skin, not attached to it. There is an absence of inflammatory reaction.

Diagnosis—Glomus tumours (multiple).

A photomicrograph of one of these tumours may be seen in the second illustration of Dr. Blanchard's[4] paper.

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THE ETIOLOGY OF SYDENHAM'S CHOREA: ELECTROENCEPHALOGRAPHIC STUDIES*

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SYDENHAM'S chorea has been generally considered as part of the syndrome of rheumatic fever. The precise rôle of the rheumatic process in the etiology of chorea is, however, not clear. Pure chorea, that is, chorea without any of the usual manifestations of rheumatic fever (joint pains, nodules, repeated sore throats, and heart disease), is rarely followed by heart disease.[1, 2] According to Findlay[3] "Either all cases of Sydenham's chorea are not rheumatic in origin or different strains of the rheumatic virus are responsible for the two manifestations". Gerstley and his associates[4] came to the conclusion that "chorea should not be taken as an indication of rheumatic infection without other rheumatic manifestations."

Pathological studies of patients with chorea are meagre, since the patients usually recover. The evidence available shows a gross picture similar to that observed in any acute infectious disease with degenerative changes, especially in the locus niger, neostriatum, and corpus subthalamicum, but cortical cells have been found severely altered in some cases.[5] It seems clear that chorea and rheumatic fever are associated with generalized and non-specific lesions of the brain with degenerative changes more marked but not confined to basal ganglia.[6] Certainly no specific local lesion has been shown to be responsible for the symptoms of chorea.

As a technique for the detection and localization of abnormalities of cerebral function electroencephalography has made rapid strides toward becoming a practical clinical tool.[7 to 12] Local degenerative lesions of the brain caused by neoplasm, trauma, etc., cause abnormal waves to appear in the electroencephalogram in their immediate vicinity.[13, 14] Generalized brain damage, such as may be produced by severe concussion, causes slow waves to appear from all parts of the brain. The slow waves disappear with clinical recovery of the patient.[14] In the epilepsies, milder forms of the same kind of abnormality seen in attacks may be recorded in the electroencephalogram taken between clinical attacks. Also many of the close relatives of patients with idiopathic epilepsy show similar abnormalities in the electroencephalogram.[15] Severe behaviour problem children[16] and constitutionally inferior children[17] show a high percentage of cases with abnormal electro-

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encephalograms. Patients with purely psychogenic disorders show normal electroencephalograms.

Abnormality in the electroencephalogram is a sign of functional abnormality of the brain, either as a result of acute inflammatory or degenerative processes or, in some cases, apparently due to some developmental defect which may have some basis in heredity. Consequently, some valuable information should be gained by the application of this new technique to the study of Sydenham's chorea, a disease of uncertain etiology and pathology.

Clinical Material

Most of the children studied were from the Rheumatic Pavilion of the Children's Memorial Hospital of Montreal; a few were from the Royal Victoria Hospital. There were 23 chorea patients most of whom were studied for a period of over 18 months. In addition, 7 cases of questionable chorea were examined. We were able to obtain electroencephalograms on one patient with active rheumatic fever without chorea and one with rheumatic carditis and no chorea. Electroencephalograms from 48 children of comparable ages were used as controls. In addition, there were available for comparison the electroencephalograms from over two thousand patients of various kinds examined in the Department of Electroencephalography of the Montreal Neurological Institute.

Technique

Electroencephalograms were taken by the usual method, using ink-writing recorders and standard placements of electrodes as described elsewhere.[14] Records were taken from frontal, central, parietal and occipital head regions with both bipolar and monopolar leads in all cases. In certain cases special localization studies were carried out as well. The patients were examined in a dimly lighted sound proof room separate from the recording equipment. A specially trained nurse was in constant attendance to signal on the record all movements of the patient as a control against movement artifacts which might be confused with electrical disturbance of brain origin.

Analysis of Data

Definite abnormalities of brain function were revealed in the electroencephalograms of all patients with severe chorea at the time of examination and in many when examined at a time when choreiform movements were not pronounced. There were three patients with mild active chorea who showed minimal abnormality in the electroencephalogram, appearing more marked when recording from deeper lying brain areas (monopolar leads from the ear lobes to the scalp surface) than when recording only superficial cortical activity (bipolar leads 3 to 5 cm. apart on the scalp surface). Since the records in these cases were not markedly different from the most extreme of the normal controls they were considered borderline or questionably normal.

In general the electroencephalographic abnormalities consisted of a decrease in the amount of normal ten per second alpha rhythm with larger amplitude slow waves (delta) in its place. In the most severe cases the normal alpha was completely absent, with slow waves between 1 and 6 per second occupying the entire record. Careful controls have served to rule out the possibility that these waves were due to movement artifacts. The degree of abnormality in a given record was indicated by the extent of which normal waves were absent and by the amount of slow wave activity present. In certain records, all from patients with mild chorea, there was some normal alpha superimposed upon random delta waves, especially with monopolar leads recording from deeper lying parts of the brain.

No strictly localized abnormality was found in any case. In the milder cases subcortical regions seemed more involved than superficial areas of the cortex and more abnormality was recorded from anterior than from posterior areas but no discrete focus of abnormal waves was detected. In all severe cases the entire brain seemed involved due to the complete absence of normal rhythms and the presence of slow waves from all regions of the head.

Cases with Borderline Abnormality in the Electroencephalogram

There were three cases who had borderline or questionably abnormal electroencephalograms and mild chorea. R.W. was a girl of 8 years with mild pure chorea in her first attack which subsided rapidly after admission. A.C., a boy of 12 years, was also a case of mild pure chorea in the first attack which subsided rapidly with bed rest. There has been no recurrence for over a year

following discharge in either of the above two cases. R.H. was a boy of 9 years with mild chorea associated with acute rheumatic fever and acute carditis, erythema and nodules. He is a recent admission still under observation in the hospital. Abnormality was definite only with monopolar leads in this case.

Three emotionally unstable children, with occasional twitching movements of the extremities, in whom the diagnosis of chorea was in doubt, were examined. The electroencephalogram in all of these patients showed borderline abnormalities illustrated by one case, J.R. in Fig. 1. These records could not be distinguished from those obtained in the three patients with definite mild chorea.

Relation Between Clinical Improvement and the Electroencephalogram

In cases studied over a sufficiently long period of time there was a marked parallelism between the clinical status and the degree of abnormality observed in the electroencephalogram. The best example was that of N.B., a girl of 8 years with severe chorea. It was her first attack. There was a history of joint pains and the presence of an apical systolic murmur. She was kept in the hospital for five months. On admission the electroencephalogram was quite abnormal as shown in the first line of Fig. 2A. At the end of the first month in the hospital there was marked clinical improvement and the electroencephalogram taken at this time showed marked improvement approaching a normal record (second line, Fig. 2A). Six weeks after discharge from the hospital there was recurrence of chorea, and another electroencephalogram taken at this time showed a return of the abnormality (third line, Fig. 2A). Her clinical course has been uneven since discharge over a year ago, there being an occasional recurrence of mild chorea.

There were two other cases with a marked parallel between clinical recovery and a decrease in the abnormality of the electroencephalogram. One was a boy of 5 years with severe chorea and a history of rheumatic fever six months previous (R.V., Fig. 2B) and the other a girl of 10 years with moderately severe chorea, her first attack, and a history of joint pains and presence of mitral and aortic heart disease (J.T., Fig. 2B). The boy with most severe chorea showed marked improvement in the electroencephalogram taken four months later when there were no clinical signs of active chorea. It should be noted that abnormality had not completely disappeared from the electroencephalogram at this time. In the girl with less severe chorea there was less abnormality in the electroencephalogram at the height of her disease, and more complete recovery was shown three months later when clinical symptoms were absent (J.T., last record, Fig. 2B). Both of these patients have done well since discharge over a year ago.

There were 6 cases with very marked abnormality in the electroencephalogram which showed very little improvement when repeated six months later. All were girls, ages 5 to 14, with severe prolonged chorea. Two had recurrence of severe attacks during a prolonged stay in the hospital. One had a history of four previous attacks in 7 years, and another had had one previous attack. Only two of these six patients had a history of joint pains and showed evidence of heart disease. The electroencephalogram from one of the most severe and protracted cases is shown in Fig. 4. She was a girl of 8 years observed during her first attack of chorea which was very severe, but there was no other evidence of rheumatic disease. She was 16 months in the hospital, during which time there were two exacerbations of her clinical symptoms. Three electroencephalographic examinations taken during this time showed such persistent and severe abnormality that a pneumoencephalogram was done, but the ventricular system was considered within normal limits. After discharge there was slow gradual improvement. Thirteen months later another electroencephalogram was taken which showed definite improvement but considerable residual abnormality still present (last line of Fig. 4). At this time there was no clinical evidence of chorea but there was definite mental retardation. A fair adjustment was being made in school by attending a special class.

It seems that, during recovery from a severe attack of chorea the electroencephalogram may return to normal somewhat slower than the usual clinical signs of active chorea.

In all of the cases studied over the past two years there has been only one mild recurrence where the electroencephalogram has shown marked improvement or return to normal. On the other hand, in those cases in which the electroencephalogram has shown severe abnormality and little or no improvement upon repeated examination the chorea has remained

protracted and severe or has recurred. It appears that this new method of examination may be of value in prognosis comparable to the sedimentation test in rheumatic fever.[18]

Hemichorea.—In three children the clinical manifestations of chorea first involved only one side of the body before becoming generalized as the chorea became more severe. In all three cases the electroencephalogram at the onset showed greater abnormality from the contralateral hemisphere. Later records showed about the same degree of abnormality from the two sides and the choreiform movements were then present also from the two sides.

THE ELECTROENCEPHALOGRAM IN SIBLINGS OF CHOREA PATIENTS

Electroencephalograms were taken of the siblings of chorea patients in two different families, 5 in one and 2 in another. Sample records from the L. family are shown in Fig. 3. This was a poor French Canadian family with 10 children, 3 with chorea. The patient was a girl of 6 years who had had an attack of chorea the year before. Both attacks were severe and prolonged. Very marked abnormality was present in the electroencephalogram taken during the second attack, and persisted until the time of discharge even though there was some clinical improvement.

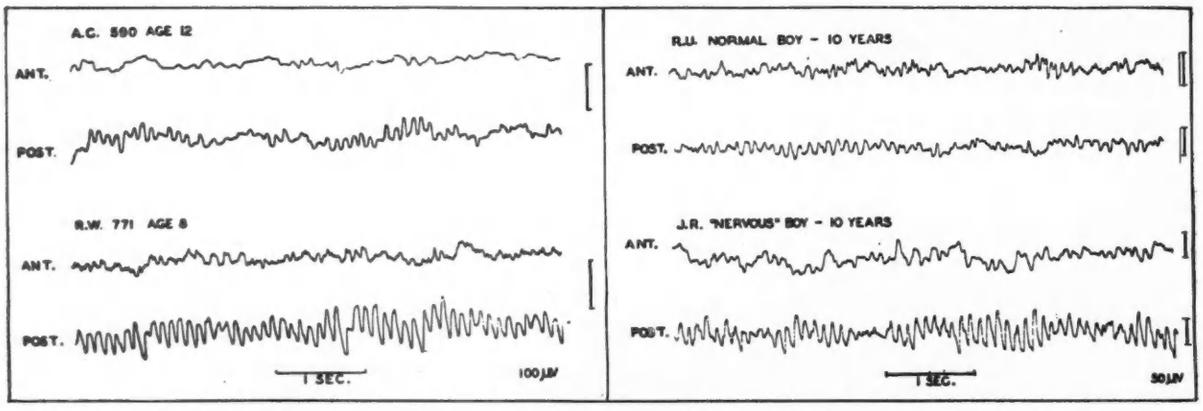

Fig. 1.—"Borderline" and normal electroencephalograms taken with bipolar leads (two electrodes 5 cm. apart on the scalp) over anterior and posterior head regions. The two pairs of records on the left were taken from two cases of mild chorea, A.C. and R.W., described in the text. The third pair of records was taken from a normal boy (R.U.) aged 10. The fourth pair of records was from a "nervous boy" (J.R.) who was submitted for diagnosis of questionable chorea. Note the normal ten per second alpha rhythm in the lower line of each pair. The amount of slow wave activity in the bipolar records of the two patients with mild chorea was not considered definitely abnormal.

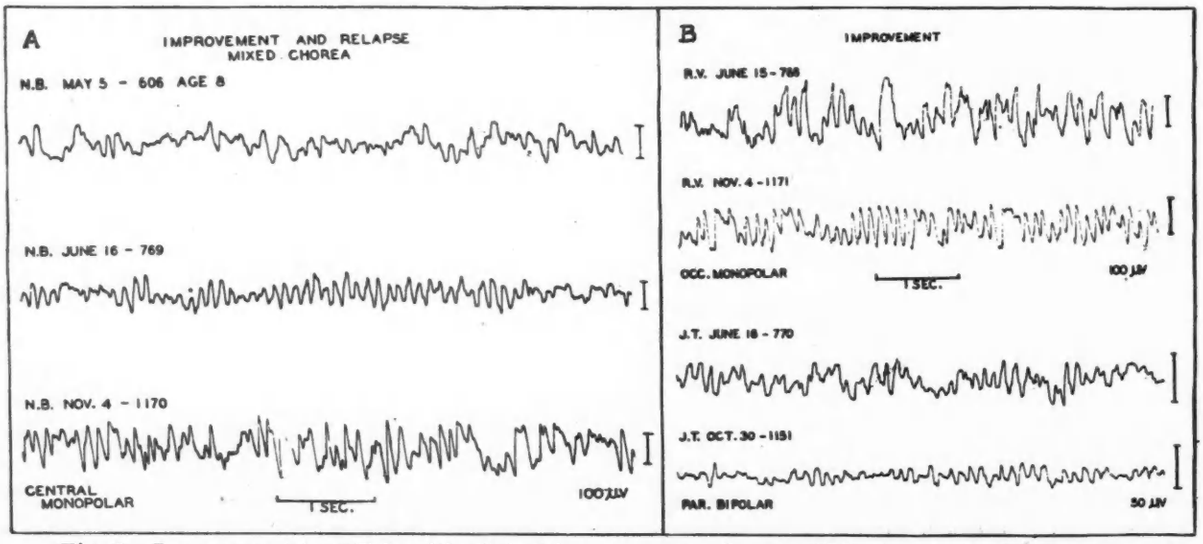

Fig. 2.—Improvement in E.E.G. with clinical improvement. **A**—case N.B. (see text) showing monopolar E.E.G. from the central head region above during an attack of clinical chorea May 5th and when she was clinically quite well about six weeks later, June 16th. Note the absence of normal alpha rhythm in the upper record with irregular slow waves in its place. In the second record the slow waves are almost completely absent and there is a good normal alpha rhythm. Five months later there was a recurrence of chorea and the E.E.G. (lower line) showed irregular slow waves with only traces of normal alpha rhythm. **B**—case R.V., fourth and fifth lines and Case J.T. in the last two lines shows two other examples of improvement in the E.E.G. parallel with clinical improvement (see text).

Electroencephalograms from five of the siblings of this patient all showed definite dysrhythmia, especially from the frontal lobes, but present in records from all head regions (Fig. 3). The abnormality was much less severe than that found in the patient but of the same general character. It was even more marked in those siblings, ages 8, 9, and 12, who had no history of chorea than in the other two, ages 14 and 16, who had a history of chorea in their pre-adolescent years.

In the second family there were 8 children only 3 of whom we had the opportunity to examine (including the patient). The patient,

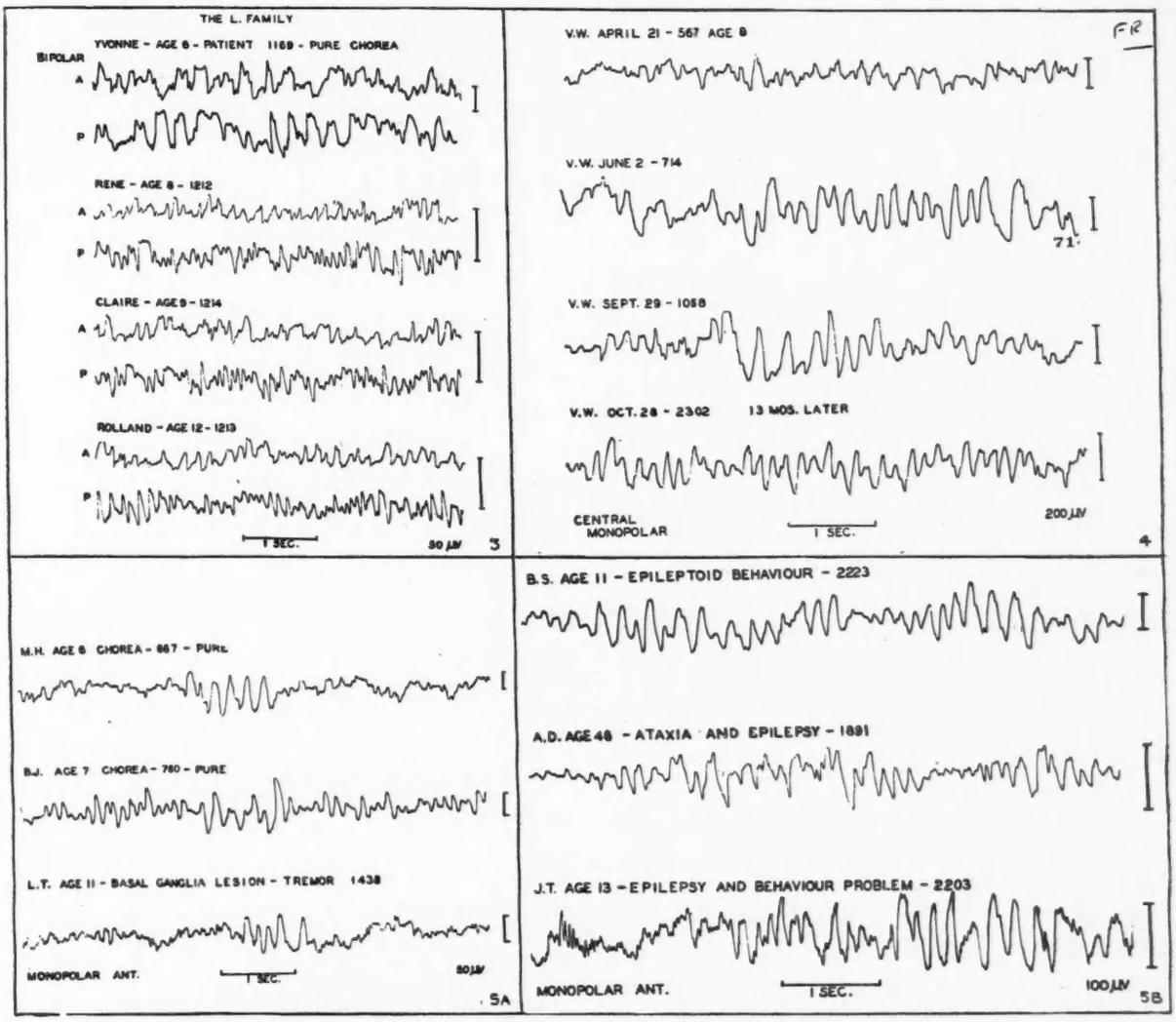
THE L. FAMILY
YVONNE - AGE 6 - PATIENT 1169 - PURE CHOREA
BIPOLAR
A
P
RENE - AGE 8 - 1212
CLAIRE - AGE 9 - 1214
ROLLAND - AGE 12 - 1213
1 SEC.
50 μV
3
V.W. APRIL 21 - 567 AGE 8
FR
V.W. JUNE 2 - 714
71
V.W. SEPT. 29 - 1068
V.W. OCT. 28 - 2302 13 MOS. LATER
CENTRAL MONOPOLAR
1 SEC.
200 μV
4
M.H. AGE 6 CHOREA - 867 - PURE
B.J. AGE 7 CHOREA - 780 - PURE
L.T. AGE 11 - BASAL GANGLIA LESION - TREMOR 1438
MONOPOLAR ANT.
1 SEC.
50 μV
5A
B.S. AGE 11 - EPILEPTOID BEHAVIOUR - 2223
A.D. AGE 46 - ATAXIA AND EPILEPSY - 1891
J.T. AGE 13 - EPILEPSY AND BEHAVIOUR PROBLEM - 2203
MONOPOLAR ANT.
1 SEC.
100 μV
5B

Fig. 3.—Mild dysrhythmia in E.E.G. of siblings of chorea patient in the L. family (see text). Records are from bipolar leads to anterior (A) and posterior (P) head regions in each case. The upper pair of records were from the patient Yvonne during an acute attack of chorea showing severe dysrhythmia with irregular slow waves and absence of normal rhythms from all head regions. The lower three pairs of records were from siblings, René, Claire, and Rolland, all showing definite, though less severe, slow dysrhythmia especially marked in anterior head regions. None of these three siblings had a history of chorea or rheumatic disease. **Fig. 4.**—Severe abnormality in E.E.G. showing little improvement. Sample records are from the case of V.W. who was examined over a period of 18 months (see text). The first three records taken in April, June and September of 1939 showed no normal activity from any head region and only the large amplitude slow waves as indicated. There was occasionally a prominent 6 per second rhythm and slower random delta waves. The last record taken in October, 1940, showed some diminution of delta wave activity with some rhythms just below 7 per second which might be a slow alpha rhythm. Clinical progress was slow, marked by recurrence of symptoms and incomplete remission. **Fig. 5.**—Dysrhythmia of chorea and certain epilepsies. **A**—Case M.H., upper line, was a girl aged 6, who first had hemichorea which later became generalized. The E.E.G. showed maximum abnormality at first from the contralateral hemisphere then equally from both sides in a later examination after the movements had become generalized. Case B.J., second line, was a girl aged 7 with mild generalized chorea and with history of epileptic convulsions up to the age of five years (with an epileptic father). The third case, L.T., aged 11, was a boy with a definite lesion of the basal ganglia revealed in the pneumoencephalogram (possible, some cortical atrophy as well), with marked continuous tremor of the right hand, and E.E.G. resembling some found in chorea patients. **B**—The fourth case B.S., aged 11, was a severe behaviour problem boy with episodic outbursts considered epileptoid. The fifth was a man of 46 years with ataxia and epilepsy, and the sixth, a girl of 13 years with epilepsy and episodes of intractable behaviour. The last four records were selected as showing dysrhythmia among those similar to that found in chorea patients.

J.S., a girl of 6 years, had a moderately severe recurrent chorea with a history of joint pains and is still under observation in the hospital. The electroencephalogram at the onset of her illness was very abnormal but showed definite improvement when repeated two months later when the clinical symptoms had subsided. Her two brothers, aged 3 years and 5 years, both showed a moderate degree of abnormality in the electroencephalogram of the same type, but much less severe that that of the patient. They had no history of chorea.

The Electroencephalogram in Rheumatic Fever without Chorea

It has been possible thus far to obtain only one electroencephalogram in acute rheumatic fever without chorea, a boy of 7 years on whom the electroencephalogram was taken three weeks following the acute onset after most symptoms had subsided. There was considerable elevation of the sedimentation rate, but there was no evidence of carditis. The abnormalities in the electroencephalogram resembled those obtained in a case of moderately severe chorea. The boy was bright and very active, with no choreiform movements. It will be of interest to follow this case in view of the possible later development of these symptoms.

The electroencephalogram from a case of chronic rheumatic heart disease of three years' duration with progressive cardiac enlargement did not show the abnormalities of chorea, but had, for the most part, a completely normal record. There was an occasional slowing of the normal rhythms such as might be occasioned by periodic circulatory deficiency.

Relation with Dysrhythmia of Epilepsy and Other Cerebral Disorders

Some of the abnormalities found in the records from chorea patients bear a close resemblance to those described in certain types of epilepsy.[19, 20] There is also some resemblance to the generalized abnormalities found in acute head injury.[14] A rather striking similarity was found in the electroencephalogram of a boy of 11 with a definite lesion of the basal ganglia (with possibly also some cortical atrophy) revealed in the pneumoencephalogram who had a continuous coarse tremor of the right hand. Certain of these similarities are illustrated in Fig. 5. It cannot be said, therefore, that there is a specific form of electroencephalographic abnormality in chorea.

When specific wave forms are considered the electroencephalogram in chorea does not bear a very close resemblance to that of epilepsy, since none of the wave forms most characteristic of the epilepsies (random spikes, the three per second wave and spike pattern, etc.[20]) have been observed in chorea. Also the large amplitude discharges observed during an epileptic attack have not been observed even during the most severe attack of chorea. The generalized slow rhythms of chorea and those found in certain epileptic patients are probably related to a non-specific damage of cortical tissue in the two conditions. It is suggestive that in one case of severe chorea whose electroencephalogram most resembled certain kinds of epilepsy there was a history of convulsions until five years of age and the father was epileptic. The exact relationship between chorea and epilepsy in view of these findings bears further study.

Discussion

There can be little doubt that a severe and generalized abnormality of cerebral function is involved in all severe cases of Sydenham's chorea, with or without the usual manifestations of rheumatic fever. This argues against the importance of psychogenic factors, at least in severe cases. We have been unable to differentiate between the electroencephalograms in pure and in mixed chorea. This may be considered evidence for a similar affection of the brain in either case. That a similar form of abnormality may be present to a moderate degree in acute rheumatic fever without chorea (one case) suggests an encephalitic aspect to this disease which may account for its frequent association with chorea.

In the diagnosis of questionable chorea a positive electroencephalogram would suggest definite chorea, but a borderline or negative electroencephalogram would not rule out mild chorea, since the amount of abnormality in very mild cases is so slight as to be often passed as within normal limits. However, during the recovery from severe chorea, fairly marked abnormality may persist in the electroencephalogram after the obvious signs of chorea have disappeared. This is similar to the findings of Jasper, Kershman and Elvidge[14] in cases of severe head injury. It might be related also to the fact that characteristic epileptiform waves may be observed in the electroencephalogram from epileptic patients even between clinical attacks

when there are no apparent clinical symptoms.

The fact that the siblings of certain chorea patients tend to show a similar disorder in the electroencephalogram is evidence for hereditary predisposition in some cases. Read, Ciocio and Taussig,[21] in a study of 33 children attending their cardiac clinic, found a significantly greater incidence than in the corresponding relatives of 33 control children. Hereditary predisposition must therefore be considered an important factor in the etiology of chorea, but it is not proved that all cases of chorea are vulnerable on this basis alone. The fact that the electroencephalogram in some cases may return completely to normal following clinical recovery suggests that an acute, probably reversible, process is the principle etiological agent in many cases with no evidence for hereditary defect. Heredity may still be important in determining that the symptoms should be those of chorea rather than some other nervous disease.

By analogy with the epilepsies we would agree with Gerstley[4] in the conclusion that chorea is a "clinical syndrome rather than a disease entity". Rheumatic fever is not the only cause, though a frequent one, and hereditary predisposition plays an important rôle in this as in many other diseases of the brain which do not have their immediate cause in hereditary maldevelopment. Like epilepsy, chorea is a symptom of damage to certain parts of the brain which may arise from a variety of etiological agents.

SUMMARY

Electroencephalographic and clinical observations on 23 children with Sydenham's chorea, many observed for over two years, have been reported and discussed. The principal findings were as follows:

1. In all cases of severe chorea severe generalized abnormalities were observed in the electroencephalogram. These consisted of a decrease or absence of normal alpha rhythms and the presence of continuous delta or slow wave activity of increased amplitude.

2. Three cases with mild chorea showed only questionable abnormality in the electroencephalogram not significantly different from the extremes of normal controls or from "nervous" children of questionable diagnosis.

3. The more severe the clinical chorea, the more severe the cerebral abnormality revealed in the electroencephalogram.

4. Clinical improvement showed a definite correlation with decreased abnormality in the electroencephalogram. In the more severe cases with recurrent attacks the abnormality in the electroencephalogram persisted in spite of apparent clinical improvement. Those cases showing prompt improvement in the electroencephalogram tended to recover more rapidly and completely from their chorea with less tendency for recurrence. Those cases showing little improvement in the electroencephalogram upon repeated examination had prolonged attacks of chorea and there was a marked tendency to recurrence.

5. The electroencephalogram may be of value in determining those cases with hereditary predisposition, since similar, though less severe, abnormalities may be found in the siblings of chorea patients especially in families in which there has been more than one case of chorea.

6. Chorea is considered a symptom of a cerebral disorder as definite as that of epilepsy and, like epilepsy, of varied etiology.

7. The abnormal electroencephalogram of chorea is not specific for this condition since it resembles closely certain dysrhythmias found in epileptic patients between attacks, those found in acute head injury, and other conditions causing generalized impairment of cerebral function. The wave forms most characteristic of the epileptic discharge were not observed in chorea, though striking similarities were observed in some cases.

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THE BACTERIOLOGY OF ACUTE OTITIS MEDIA AND ITS COURSE UNDER NEW AND OLD METHODS OF TREATMENT*

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INFECTIONS of the middle ear are usually benign, but occasionally they lead to considerable involvement of the temporal bone, which may extend into the brain, brain coverings, or blood vessels. Death may result. On the other hand, acute otitis may smoulder on until it becomes chronic, or it may dry up and simply leave adhesions which produce a residual deafness. Since the advent of the sulphonamides there has been much controversy between the general medical men and the otologists concerning the various methods for treating otitis media and early mastoiditis.

Before whole-heartedly subscribing to any new form of treatment for a disease we should know the average expectancy under the old forms of treatment. Textbook chapters on otitis media infer or state that the acute suppurative and non-suppurative forms usually subside in a few days to a few weeks. This is correct, but how many cases may be expected to subside in a few days? What type are these? How may the physician decide which cases will subside spontaneously with simple remedies and which must be treated with the more heroic and potentially dangerous methods such as surgery or chemotherapy?

The expectancy of deafness in acute otitis has never been adequately studied. The only audiometric report is that of Bunch and Grove[1] who selected infants and examined them several years after they had had 3 or more myringotomies; 30 ears out of 160 (about 18 per cent) showed detectable deafness; 10 of these ears were discharging at the time of the examination. I could find no figures on the incidence of deafness following less severe otitis, and my own observations are not complete; they must be left for a future communication.

There are many reports in the literature which bear on the incidence of mastoiditis. They are most confusing because they show anywhere from 1 to 69 per cent of cases of otitis media per year coming to mastoidectomy, and rarely involve enough cases or cover a long enough period to be of statistical importance.

That indiscriminate use of chemotherapy for acute otitis media to prevent mastoiditis is unnecessary and unwarranted will be shown in this paper, without in any way detracting from the wonderful results that can be obtained with proper dosage in many cases of early mastoiditis and even in meningitis of otic origin, when the invading organism is the streptococcus or pneumococcus.

When this study was begun it was intended to analyze the course of all the cases of acute otitis media in the Medical Centre since the children on the otologic service of the Presbyterian Hospital were taken over by the Babies' Hospital, and the service reached approximately its present activity in 1933. The cases were traced from their culture reports in the Department of Bacteriology because many of them were not definitely diagnosed as otitis media and therefore could not be traced in the Record Room. If bacteria were grown from the canal cultures and the case was not an external otitis (which could be ascertained from the chart) it was designated as acute suppurative otitis media whether so diagnosed by the attending surgeon or not. This material from the unit histories covering both in-patients and out-patient visits was too extensive for a complete study covering all the patients with suppurative otitis media from 1933 to June, 1940 (more than 4,500). Accordingly, the years 1938 and 1939 were selected for detailed appraisal, because in these years a comparison could be made between the cases treated with the old and new methods. Very little data were found concerning non-suppurative cases, unless they developed into suppurative cases, but it can be presumed that a much larger percentage of these cases than of the suppurative cases get well spontaneously. Perusal of Table I will show that during the years 1938 and 1939 approximately 79 per cent of all types of discharging ears dried up without

* From the College of Physicians and Surgeons, Columbia University, the Presbyterian Hospital, the Babies' Hospital, the Vanderbilt Clinic and the Manhattan Eye, Ear and Throat Hospital.

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TABLE I.

DURATION OF DISCHARGE AND OCCURRENCE OF MASTOIDITIS IN O.M.P.A.

1938 and 1939—Without chemotherapy

Organism cultured	*1 week or less*	*2 weeks or less*	*3 weeks or less*	*4 weeks or less*	*Over 4 weeks*	*Mastoidectomy*
Staph.	*Percentage*	*Percentage*	*Percentage*	*Percentage*	*Percentage*	*Percentage*
All types 388 cases.	44	65	77	*85*	10	4
H. Strep. 276 cases.	16	31	49	*69*	15	16
Pneumo. All types 146 cases.	45	72	82	*89*	5	6
Others 153 cases.	36	56	65	*70*	20	10
Total 963 cases.	35	55	68	*79*	12	9

chemotherapy in less than four weeks, and 35 per cent ceased to discharge in less than one week. The cases treated with chemotherapy will be discussed later.

Many factors contribute to the incidence and duration of otitis media, the occurrence in a given individual, and the development of extensions and complications:

1. *Place and climate.*—The percentage of various types of infection in different cities as given by other authors is shown in Table II. Unfortunately, I have been unable to find figures on otitis media from tropical countries, but H. M. Taylor, of Jacksonville, has the impression that the course and the bacteriology on the east coast of Florida is similar to that in the north. Lester A. Brown reports 66 per cent streptococcus in the mastoiditis of Atlanta, Ga. H. Colemore, of San Juan, tells me that the predominant organism in upper respiratory infections in Puerto Rico is the staphylococcus, and E. F. Font writes that otitis media tends to be due to this organism much more than in the north.

2. *Age.*—The very young are said to have a higher morbidity. We found 25 per cent of our cases to occur in the ages 0 to 2, 57 per cent in the ages 2 to 12, and the remaining 20 per cent in the ages of 12 and older. Altmann finds a high incidence of mastoiditis in older individuals, as does Chang; neither compares this with the incidence of otitis media. Infants tend to have less pneumatization of their mastoids, and there is therefore less surface epithelium to produce exudate and less distance for the exudate to travel before it drains from the middle ear. For this reason, they are less likely to have severe mastoiditis. On the other hand, they have shorter, straighter Eustachian tubes, and especially if the tubes are blocked by adenoid tissue, they tend to become easily infected. Older people have more immunity to infection less adenoid and longer tubes which protect their mastoids. Children from 2 to 12, however, may have large mastoids and no immunity. They tend to have surgical mastoiditis.

TABLE II.

PERCENTAGE OF DIFFERENT ORGANISMS IN OTITIS MEDIA AS GIVEN BY VARIOUS AUTHORS

	Hæm. strep.	*Other strep.*	*Pneumo. III*	*Other pneumo.*	*Staph. (all)*	*Others*	*No. growth*
Vaheri, Helsinki, Finland, 1932-6, 200 acute mastoids	68.5	0.5	24.0	3.0	1.5	2.5	..
Altmann, Vienna, Austria, 1926-34, 1,457 acute mastoids	66.2	..	18.7	10.9	..	4.2	..
Kreutz and Witter, Detroit, 1926-36, 300 acute mastoids	63.0	8.0	5.0	2.0	9.0	4.0	9.0
Inutsuka and Kumami, Japan, 1914-35, 414 acute mastoids	30.1	18.5	21.4	10.7	2.6	17.7	..
Wirth, Heidelberg, Germany, 211 acute ears	44.4	1.8	20.0	19.9	7.7	6.2	..
Dunlap, Peiping, China, 1920-5, 488 unclassified	34.7	4.2	0.8	0.5	33.5	26.3	..
*Fowler, New York City, 1933-9, 2,755 acute ears	33.6	2.7	6.4	11.1	36.7	9.5	..
Page, New York City, 1933-4, 836 acute ears	30.1	2.1	13.9	0.3	22.4	7.9	23.3

*Figures for pure cultures only. For mixed cultures see Table IV.

3. *Time* (see Chart 3).—The disease occurs in yearly cycles, and in New York is most prevalent in March and April. In Japan it is November, December and January while in Baltimore (Fisher) it is most prevalent in December, January and February. Other cities undoubtedly show peaks according to the climate and incidence of respiratory infections.

4. *Sex.*—The incidence according to sexes seems to be almost evenly divided. Out of 1,496 cases we find 47.5 per cent females. Tomb[4] has reported a higher incidence in females, said to be due to the fact that mothers are more subjected to the upper respiratory

infections of their children than fathers. This does not occur in other reports, which usually show a slight preponderance among the males (*cf.* Altmann[2]).

5. *Occupation.*—There are a few figures on this (*cf.* Tomb[4]). It is a well known fact that professional swimmers, aviators and "sand hogs" are prone to develop otitis media. In confirmation of the impression of Tomb, that contact tends to spread otitis media, we find that our student nurses in Babies' Hospital are more prone to develop upper respiratory infections and often otitis media when assigned to the ear, nose and throat service, than when assigned to other services.

6. *Heredity.*—This must be a most important factor. In the first place, it controls the pneumatization of the mastoid, the anatomy of the Eustachian tube, and the growth of adenoids, all potent factors in otitis media. Further, Webster has shown incontrovertibly that there are hereditary factors in both susceptibility and immunity to infection.

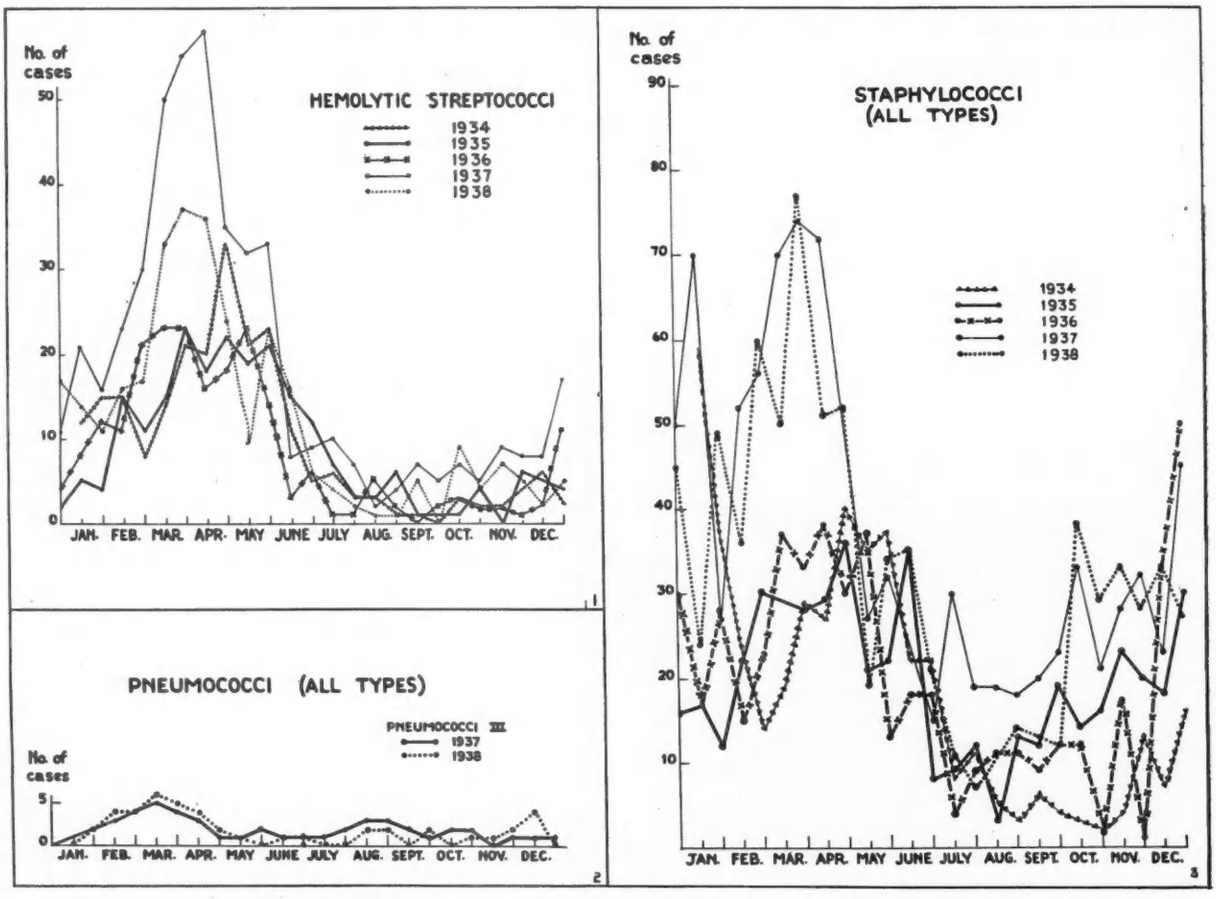
7. *Habits.*—Improper clothing, blowing of the nose, swimming, flying, careless exposure to unusual weather conditions, fatigue, heavy drinking, smoking, all may be factors in otitis media.

8. *Diet.*—Vitamins are said to have considerable influence on infections of the upper air passages.

9. *Allergies.*—Allergic rhinitis tends to stop up the nose and cause secondary infections in the upper respiratory passages, and sometimes directly stops up the Eustachian tubes.

10. *General physical condition.*—Patients with general debilitating diseases are prone to develop low-grade otitis media. This is particularly so in children and patients with diabetes, pneumonia, scarlet fever, influenza and measles. Those who are unusually susceptible to the common cold tend to develop otitis media.

11. *The physician and nursing.*—These often have much to do with the shortening of the disease process and the avoidance of operations. Early myringotomy is important. In our 1938



Charts 1, 2 and 3.—Showing the occurrence of otitis media in the Columbia Presbyterian Medical Centre, according to months and years.

to 1939 series there were more than twice as many mastoidectomies following spontaneous perforation as following myringotomy. Page[3] finds the ratio 3 to 1. Many cases which would be operated on for mastoiditis by one surgeon will recover under the care of another more experienced or conscientious, with the courage to wait until it is certain that the patient will not get well without surgery.

12. *Reaction to medication.*—Some patients are sensitive to special medications; some excrete them so fast that they are practically valueless; some vomit or cannot tolerate them in other ways. There is always an indefinable individuality of response in a given case. Idiosyncrasies may account for fever, rashes, hæmaturia, neuritis or mental symptoms. More to be feared are anæmias and leukopenias. Kidney stones, anuria, and uræmia have occurred especially with sulfapyridine and sulfathiazole, but apparently this can be avoided if proper fluid intake and output are maintained.

13. *Chance.*—This is an indeterminate factor in all disease.

14. *Types of infection.*—The virulence of the organisms and the individual's immunity to it has much to do with the course of the disease. One of my graduate students, Dr. Frank Alter, has shown that in a case where a patient was combating a streptococcus infection well there was immediate *in vitro* phagocytosis of cultures of the patient's organism when mixed with his whole blood. In another patient, who was clinically not doing well, the *in vitro* phagocytosis of this patient's organisms by his own white cells was much less marked, in fact almost nil.

The types of infection found in our series are shown in Table III, and their incidence according to years and months in Chart 3. The incidence found by other investigators in other cities is shown in Table II. It will be noted that there is considerable variation in these figures, and the only ones that correspond to mine are the figures of Page. These include "no growth" in the total and so slightly lower the percentage values. For some unknown reason the percentage of pneumococci, other than Type III, is very low. The variation with all authors may well be due to their omission of organisms shown in Table III, which are usually contaminants. Certainly diphtheroids and fungi can very well be omitted, but they are included here for record and to give some

TABLE III.

BACTERIOLOGY OF OTITIS MEDIA AS SHOWN BY ROUTINE CULTURES

Organism	*No. from canal*	*Percentage from canal*	*No. from mastoid*	*Percentage from mastoid*
Streptococcus Hæm.	2,175	27.6	371	56.7
Staph. albus	1,451			
Staph. albus hæm.	239			
Staph. aureus	808			
Staph. aureus hæm.	995			
Staph. (all types)	3,493	44.4	99	15.1
Pneumo. Type I	227	3.0	14	2.1
II	28			
III	334	4.2	46	7.0
IV	33		2	
V	52		1	
VI	22			
VII	30			
VIII	23		1	
IX	5			
X	13			
XI	7			
XII	5			
XIII	7			
XIV	19			
XV	3			
XVI	13			
XVII	8			
XVIII	11			
XIX	42		2	
XX	3			
XXI	2		1	
XXII	4			
XXIII	5			
XXIV	2			
XXV	1			
XXVII	7			
XXVIII	6			
XXXII	2			
Unclassified	68			
Pneumo. (all types)	992	12.6	73	11.1
S. viridans	356	4.5	8	1.2
B. pyocyaneus	250	3.1	12	1.9
B. proteus	156	1.9	10	1.5
B. subtilis	104	1.3	3	0.5
B. fæcalis alkaligenes	75	0.9	1	0.1
E. coli	59	0.7	2	0.3
H. influenzæ	56	0.7	2	0.3
*C. diphtheriæ**	50	0.6		
A. ærogenes	34	0.4		
M. catarrhalis	21	0.2	3	0.5
M. tetragenus	15	0.1		
B. Friedlanderi	10	0.1	2	0.3
Salmonella (unclassified)	4	0.05		
Aspergillus niger	4	0.05		
C. tertium	2	0.02		
B. penicillium	1	0.01		
C. prodigiosum	1	0.01		
C. ærofœtidium	1	0.01		
Total organisms	7,459		654	
Diptheroids	858	10.9	37	5.6
No growth	278	3,2	119	14.9

* Sugar tests positive but virulence tests negative. These cases would nowadays be classified as diphtheroids.

idea of the accuracy of the bacteriological reports. Part of the variation in reports of middle-ear bacteriology may also be due to the method of taking the cultures. Our cultures were made by inserting a sterile swab into the external meatus, to pick up the discharge from a spontaneous or myringotomy perforation. The organisms were first planted in both broth and blood agar, and then replanted on blood agar or special broths, if necessary, for identification of a certain organism. The canal was in many instances cleaned mechanically, filled with 70 per cent alcohol, emptied, and allowed to dry, but it is impossible to tell how often this was done. Page advises direct cultures from the myringotomy knife, but this is difficult if easy access to culture media is not available to the out-patient department.

organisms in cases which do not come to operation. The diphtheroids, fungi, and coli groups are undoubtedly contaminants in almost all instances, but some of the staphylococci tend to persist in chronic mastoids, and since they often occur in conjunction with streptococci they are included here, with the knowledge that they too may very well be contaminants two-thirds of the time. The probability of contamination can be estimated when we learn that from 25 normal canals staphylococcus was grown 11 times. Out of 153 cultures from canals before myringotomy the staphylococcus was recovered 91 times, and occurred in subsequent cultures of the discharge from the ear 62 times. The staphylococcus occurred in the middle ear but not in the canal 15 times, and 29 times in the canal but not in the middle ear.

TABLE IV.

COMPARISON OF CULTURES TAKEN FROM THE EXTERNAL AUDITORY MEATUS BEFORE AND AFTER MYRINGOTOMY

	Staph. alb.	*Staph. aur.*	*Diphtheroids*	*B. subtilis*	*Hæm. strep.*	*Strep. vir.*	*M. tetrag.*	*Pneumo.*	*H. influenzæ*	*B. proteus*	*B. alkaligenes*	*B. pyocyen*	*Total organisms*
Cultures of skin before myringotomy:													
Pure	52	11	13	8	5	2	2	1	0	0	0	1	95
Mixed	22	6	13	6	6	3	0	2	1	1	1	0	61
Total	74	17	26	14	11	5	2	3	1	1	1	1	156
Cultures of discharge after myringotomy:													
In discharge but not in skin culture	6	9	8	4	45	3	1	28	1	0	2	0	106
Same as skin and pure	7	3	0	0	1	1	0	1	1	0	0	1	15
With same organism as in skin culture	11	4	4	2	3	0	0	1	0	0	0	0	25
On skin but in discharge with different organism	13	3	2	2	0	0	0	0	0	0	0	0	20

Out of 153 cases, there were 27 which showed no growth before myringotomy, and 3 which showed no growth after myringotomy. The figures in the table represent the number of times a given organism was recovered.

Over 60 per cent of our acute otitis media cases grow out staphylococci or other organisms (Table III). Now, it is believed that many of the organisms recovered, including the staphylococcus, are merely unimportant contaminants of cultures taken from the neighbourhood of the tympanic membrane, and that the hæmolytic streptococcus is the only organism of importance in otitis media. This comes from using only cultures taken at mastoidectomy for otitis media studies (*cf.* Table II). Admittedly, these are most accurate from the bacteriological standpoint, but they may give us false ideas concerning the infecting (For detailed bacteriology of the canal see Table IV and note that many of the organisms are the same as those shown in Table III, indicating that they are probably contaminants in many instances.)

The occurrence of "no growth" we believe largely to be due to drying out of the culture swabs, but the suggestion of Henry and Kuhn, that they represent a clinical entity of sterile otitis should be seriously considered. Theoretically, many of the cases showing no growth may have been invaded by anaerobic types of streptococcus which would have been recovered if unusual techniques for routine cultures had

been employed. But taking routine anaerobic cultures at the Presbyterian Hospital has uncovered no unusual pathogens during the spring of 1940, not even anaerobic streptococci, which did not grow under the usual aerobic methods. Anaerobic methods are apparently unnecessary as a routine procedure.

COMPARISON OF NEW AND OLD METHODS OF TREATMENT

As mentioned before and shown in Table I under the old methods of treatment about 80 per cent of acute suppurative otitis medias dried up without major surgery following treatment of the nose, nasopharynx and mechanical cleaning of the canal after spontaneous perforation of the drum or myringotomy.

We have had one successful experience with the treatment of otitis media with immune sera:

A 63 year-old woman with a large mastoid and profuse discharge developed a steadily rising temperature. Myringotomy had been performed a few hours after the onset of the disease, but the temperature rose until, on the third and fourth day it was 103° F. Culture from the discharge showed pneumococcus, Type I. Accordingly, Type I immune serum (using the rabbit globulin fraction to avoid reaction) was administered as for pneumonia. The temperature dropped to 100° in 24 hours, but rose to 102° the next day. Following a second injection of Type I antibody, the temperature remained normal and the discharge cleared in one week.

Since 1936 an entirely new approach to the problem of infections in the middle ear has been advocated, especially by the pædiatricians and general medical men. The tendency has been to prescribe sulfanilamide, sulfapyridine, sulfathiazole or one of their modifications in the earliest stages of all types of otitis media, whether suppurative or non-suppurative, as well as for mastoiditis and its complications. It is much easier to prescribe pills than it is to do a myringotomy in the home. Often the patients demand that the sulphonamides be given, and occasionally they begin medication themselves by obtaining one of them without prescription from the neighbourhood pharmacist. Chemotherapy is the fashion. Hauser[6] reports that 90 per cent of the physicians who answered his questionnaires in 1938 used sulfanilamide and that 58.5 per cent used it without previous cultures. A few authors advise the combined use of chemotherapy and immune sera in certain cases (*cf.* Lyons).

My first attempt at chemotherapy for early otitis media was made in 1937, when the knowledge of the sulphonamides was very limited. At that time it was believed that sulfanilamide should be reserved for streptococcus cases. It was known from the work of Lockwood and others that a continual maintenance of a certain amount of the drug in the blood is more important than intermittent higher levels. The mothers of patients (or if old enough, they themselves) were all carefully instructed to administer the drug at specific, carefully spaced hours of the day and night. Setting an alarm clock for each dose was advised. It was considered unsafe to prescribe very large doses of sulfanilamide to ambulatory patients, so that the minimum that could be expected to produce a result was ordered.*

TABLE V.

DURATION OF DISCHARGE AND OCCURRENCE OF MASTOIDITIS IN O.M.P.A.

1938 and 1939—With chemotherapy

Organism cultured	*1 week or less*	*2 weeks or less*	*3 weeks or less*	*4 weeks or less*	*Over 4 weeks*	*Mastoidectomy*
Staph.	*Percentage*	*Percentage*	*Percentage*	*Percentage*	*Percentage*	*Percentage*
All types 76 cases..	18	42	60	67	15	18
H. strep. 190 cases.	15	40	54	72	12	16
Pneumo. All types 58 cases..	43	65	81	68	4	8
Others 23 cases..	26	52	61	74	9	17
Total 347 cases.	21	46	61	74	11	15

The drug was stopped when the discharge stopped. After a few months of this study, involving 141 cases in one clinic and 83 in another, it did not seem that the duration of the discharge was any less than in the control series on alternate clinic days which were receiving no medication. It was suspected that the patients were ingesting insufficient dosage, and this was confirmed when several sulfanilamide blood levels were taken and found to be zero. It was found, moreover, that the instructions about the midnight and early morning dose were rarely obeyed. Particularly distressing were the num-

* Each dose was 0.3 grams (5 grains) for children under five; 0.45 grams (7.5 grains) for children from five to twelve, and 0.6 grams (10 grains) for persons over twelve, *five* times a day, at 6 a.m., 10 a.m., 2 p.m., 7 p.m. and midnight. This makes a total of 1.5 grams (25 grains), 2.25 grams (37.5 grains) and 3.0 grams (50 grains) per day in each age-group respectively. Often the first dose was doubled.

ber of recurrences which occurred three or four days after the medication was stopped. The drug when given to ambulatory patients apparently merely attenuated the disease a little, and in the end prolonged its course.

Study of cases of otitis media medicated by others in the wards and clinics of the Medical Centre during 1938 and 1939 (Table V), when compared with the non-medicated cases (Table I) confirms this 1937 impression in more detail, and still gives no indication that chemotherapy is of any use in the treatment of suppurative otitis media.

Analysis according to dosage of 100 consecutive charts in which chemotherapy was used for otitis media is shown in Table VI. Any case which did not receive the dosage in the footnote (see page 377) at least 4 times a day and which did not continue the drug in some dosage for at least two days after symptoms ceased was considered inadequate. Most of the cases listed under inadequate dosage were ambulatory cases. Most of those receiving adequate dosage were hospitalized. The commonest mistake in the inadequate dosage group was to stop medication too soon. A few cases under seemingly adequate dosage went on and developed mastoiditis in spite of everything. Most, however, responded even if the medication was not started for several days after the onset of the disease. After all, chemotherapy should be effective as long as there is no extensive necrosis in the mastoid, and we know from x-rays and from pathological specimens that this does not occur to any extent for two to three weeks and sometimes more after the initial infection.

TABLE VI.

EFFECT OF SULFANILAMIDE IN 100 CASES

Post-operative, questionable effect	6
Reaction	6
Recurrent	11

Apparently	*Inadequate dosage*	*Adequate dosage*
No effect	31	11
Questionable effect	18	3
Good effect	18	25

All but four of the cases on adequate dosage were in hospital.

"Questionable effect" represents cessation in less than two weeks.

"Good effect" represents cessation of discharge in less than a week.

The prolongation of the disease due to insufficient dosage often occurs in private practice, where a pædiatrician or a general practitioner prescribes a moderate dose of sulfanilamide three times a day (often without cultures) for an early otitis. The usual practice is to stop the drug with the fall in the temperature or, at best, with the cessation of the discharge. These half-medicated cases later come to the otologist with necrotic mastoids. They may have no temperature, no pain, and a normal white count, especially if the medication has been started again with recurrence of symptoms. They are prone to develop complications under the very eyes of their physicians. The high erythrocyte sedimentation rate which usually occurs and a general feeling of malaise are often the only signs of anything wrong. An x-ray of the mastoid, if it shows definite breaking down, will often help, but even here, according to Law, sulfanilamide-treated patients do not show as much destruction in the mastoid or as much clouding by x-ray as the patient who has not been so treated.

Occasionally, infection in the mastoid goes on to necrosis in spite of adequate sulfanilamide treatment. In these cases there is usually some reduction of the pain and of the discharge, but at operation there is breaking down of the bone by a greyish, necrotic-looking granulation tissue from which rarely can be cultured an offending organism. It is the recurrent cases, and these last mentioned, masked cases which make so many thinking otologists suspicious of the new drugs. After all, it is the otologist who sees all the unsatisfactory results of medication, and is often called upon to diagnose and to instigate surgical procedures upon cases which are extremely difficult because the usual symptomatology has been masked by medication. Streptococcus cases become as difficult as the dreaded pneumococcus III cases used to be, and the latter become still more unpredictable.

On the other hand, there are examples of patients who, under the old methods of treatment would have been subjected to mastoid operations, who have been cured by proper chemotherapy. Many of the 25 in Table VI are of this group. Let me report one extraordinary case:

A white man, aged 76, came to my office with a history of discharge and loss of hearing in the left ear of three months' duration. He had been treated for this in a fashionable winter resort by injections of *M. catarrhalis* vaccine. Examination showed an external canal filled with thick, purulent material which grew a pure culture of pneumococcus III on four separate occasions. There was no pain, but rather a full feeling in the ear and a well-marked sagging of the superior canal

wall. Two consultants, one an eminent otologist and the other an internist, agreed that chemotherapy in this case would probably be of no avail. It was decided, however, to try sulfapyridine, with the proviso that if there was no improvement in three or four days operation must be performed. In three days the discharge had decreased considerably, in five days it had stopped, but the drum continued to be without landmarks. It was red superiorly and the canal wall still sagged. Finally, on the twelfth day, the hearing suddenly returned. Not until then was the medication decreased. The blood level had been kept as high as 11 mg. per cent. The patient was kept in the hospital for a week after cessation of the medication. He complained at no time from the effects of the drug and had no recurrence.

Most cases where the disease has progressed as far as in the one cited will not respond to chemotherapy, even if given in high dosage for a long period of time. Chemotherapy is worth trying, however, if there is no extensive destruction in the mastoid to be seen by x-ray. Lockwood has shown that in the presence of tissue destruction chemotherapy is rarely effective. If there is no improvement of the clinical course of a suspected case in a few days the operation must be done. In a very few cases in the series, the temperature fell gradually over a period of ten days, but even here there was clinical evidence of improvement: loss of pain, etc., in 24 to 48 hours after starting the drug.

There is some evidence that the post-operative course will be shorter if the patient's blood is kept saturated with the proper drug. Theoretically, there is less chance of complications. We have had no cases of complication and never delayed healing of the wound following mastoidectomy in cases where sulfanilamide was given pre-operatively, followed by sustaining doses for a few days after the cessation of the fever post-operatively. The only possible objection to the use of both chemotherapy and surgery together is that *masking of complications* may occur.

In studying this subject one suspects that more patients are admitted to the hospital for chemotherapy, thus raising the *recorded* number of cases of otitis media and so lowering the percentage of mastoiditis. The treatment with sulfanilamide is expectant treatment, and if one waits long enough many patients that might ordinarily be operated on will get well spontaneously. Most otologists have had the experience of putting off a mastoidectomy for two or three days, because there were no beds in the hospital or some other inconvenience, only to find the patient recovered in the meantime.

SUMMARY AND CONCLUSIONS

Acute suppurative otitis media is, as a rule, a self-limiting disease; 80 per cent of unselected clinic cases get well in less than 4 weeks. A higher percentage of cases get well in this time if the canal is kept clean, the nose shrunk, and there is proper care of the Eustachian tube. A still higher percentage get well if the disease is non-suppurative. More patients would avoid mastoidectomy if their surgeons could treat them expectantly for a longer period.

The incidence of otitis media and the virulence of the organism causing it, vary from year to year. There is also variation with location. In New York, the incidence is high and peaks are in March and April, but there is a secondary peak in December. The former tend to be due to streptococci, the latter to staphylococci. Approximately 40 per cent of middle-ear cultures taken from the external auditory meatus contain staphylococcus and 10 per cent contain other organisms for which no chemotherapy has as yet been developed.

A large percentage of the cures attributed to chemotherapy are due to spontaneous remission rather than to medication. On the other hand, if a case of acute, suppurative otitis media is due to a beta-hæmolytic streptococcus or a pneumococcus, and does not seem to be doing well during the first week or ten days of the disease vigorous chemotherapy should be instigated. It is more often indicated following spontaneous perforation than following early myringotomy. As the years go by we may expect to have specifics for other organisms and fewer toxic side actions.

Ambulatory dosage of sulfanilamide or similar drugs is unjustified. Chemotherapy is not indicated unless it is suspected that the given case of otitis media is progressing to mastoiditis, chronicity, or deafness.

Chemotherapy need never be instituted without bacteriological study. If chemotherapy is instituted it should be applied, if possible in the hospital or in the home, with cultures, blood counts and urinalysis every two days under the direction of a trustworthy nurse, who understands the importance of continuous dosage and proper fluid intake and output.

Chemotherapy should be considered in the same class as surgery, as a serious treatment, and its administration continued for *at least a week* after acute symptoms cease. If chemo-

therapy in adequate dosage does not change the clinical picture markedly in two to three days, another treatment, usually surgery, is called for.

Chemotherapy usually masks the classical symptoms of progressing otitis media, and the handling of an individual case must be coloured by this fact. If lateral sinus involvement is suspected it is wise not to complicate the picture by chemotherapy, which will only prolong the course of the disease if a perisinus abscess or infected clot is present. Chemotherapy does not replace surgery if an undrained, necrotic focus is present.

As new, more efficient, and less toxic drugs come on the market our ideas must necessarily change, but any physician who in shot-gun fashion prescribes a drug to all cases without discrimination is reflecting ignorance, laziness, or poor judgment as to the expectancies of serious trouble from otitis media. He may sensitize his patient, damage his liver or kidneys, or render him drug-fast while using chemotherapy for a minor ailment, which at a later date might then be unavailable for a serious infection.

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THE DIETARY MANAGEMENT OF INTESTINAL TUBERCULOSIS*

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FOR a number of years we have studied the cases of intestinal tuberculosis occurring among the tuberculous patients in the Mountain Sanatorium, Hamilton. During this time we have gradually made progress in the institutional and dietary care of these patients. In this communication are presented the details of the diets used.

From January 1, 1935, to July 1, 1940, we have studied 120 cases of intestinal tuberculosis. These cases were admitted directly to our intestinal service or transferred to that service from other wards within the institution. All have been under treatment for more than six months, unless death intervened. Ninety-five per cent of the patients had far advanced pulmonary tuberculosis, and all but one showed sputum containing tubercle bacilli. The diagnosis of intestinal tuberculosis was made by means of x-rays of the gastro-intestinal tract, according to the method and diagnostic criteria of Brown and Sampson.[3]

In 17 of the patients who died and had post-mortem examination the diagnosis of intestinal tuberculosis was confirmed in each instance. All of the 120 cases were of the type of intestinal tuberculosis most commonly encountered, that is, they exhibited ulcerative intestinal lesions, the infection occurring by way of the intestinal tract as the result of swallowing sputum containing tubercle bacilli.

Of the 120 patients studied 61 died. Twenty-two of the 61 died in from three days to four months following their transfer to the Intestinal Service. All of these twenty-two had active, progressive pulmonary tuberculosis, which precluded any chance of recovery, apart altogether from the existence of the intestinal complication.

For 15 of the remaining fatal cases, the intestinal lesion was not a major factor in the causation of death. The various causes of death in this group were as follows: hæmoptysis, two cases; post-operative deaths following major chest surgery, three cases; amyloid disease, one case; tuberculous empyema with bronchopleural fistula, one case; acute bronchogenic spread of pulmonary tuberculosis, one case; rup-

* A paper read at the Annual Convention of the Canadian Tuberculosis Association, in Montreal, June, 1940.

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tured duodenal ulcer, one case; slow extension of pulmonary tuberculosis, four cases.

In 10 of the 15 cases listed above repeat x-rays of the gastro-intestinal tract showed definite improvement of the intestinal complication. In 5 others of the fifteen these repeat intestinal x-rays showed no increase in the intestinal disease. In 4 of the 15 cases autopsies were performed, and the cause of death was found to be, respectively, perforation of a duodenal ulcer, hæmoptysis, acute bronchogenic spread of pulmonary tuberculosis, and tuberculous empyema.

Of the total 120 cases in this series 59 were alive on July 1, 1940. The present condition of this group of 59 is as follows: 22 are discharged; 17 are still in the sanatorium, but not under treatment for intestinal tuberculosis, which, clinically and by x-ray evidence, is cured or greatly improved; 20 cases are still under dietary treatment. Of these 20 a group of 14 show by intestinal x-ray definite improvement of their intestinal ulceration. Six cases have still an uncertain prognosis.

In the treatment of intestinal tuberculosis proper dietary management is always important, and frequently is absolutely essential for the patient's recovery, no matter what other form of therapy is used. Theoretically, the dietetic therapy of intestinal tuberculosis consists in supplying food which will be optimum for nutrition in a bland, low-residue form, which will produce the least irritation and diminish excessive peristalsis in the intestinal tract. The necessity for modification of the ordinary ward diet to meet these criteria has been recognized by many authors.

Moore[10] refers to the greater difficulty and need for maintaining nutrition when intestinal ulceration supervenes in a case of pulmonary tuberculosis. Chan[4] mentions the value of bland diet in decreasing peristalsis and advocates the use of vitamins D and C, not only to aid calcium metabolism but to accelerate healing of the intestinal mucosa. McConkey[8] showed the curative effect of vitamins C and D on the intestinal lesion when tomato juice and cod liver oil, the latter of course including vitamin A, were added to a general diet. Steinbach,[11] using McConkey's treatment, and estimating the results of therapy on autopsy findings does not believe that this treatment is either preventive or curative. McLaughlin[9] recommends the use of high vitamin diet. He also advises against the use of certain foods, such as peas, beans, cabbage, because of their fermentation producing gas, which by distending the bowel stimulates peristalsis. Dixon[5] advises against very cold drinks, strong coffee, fruits, salads, concentrated beef essences and excess milk, because he believes they increase intestinal peristalsis unduly. He definitely advises low-residue high vitamin diet. Brown[3] advocates bland, low-residue high vitamin diet. Bellinger[1, 2] has given low-residue diets but has compromised on a more generous diet which supplies adequate vitamins and minerals. He points out the need for supplying adequate vitamin C because the absorption of vitamin C is directly proportional to the clinical activity of tuberculosis. Gorman[6] advises a bland diet, non-irritating, not too high in calories, with sufficient protein and high vitamin content. Hardt[7] advocates a high vitamin high mineral diet, smooth, and of low residue. He also recommends the giving of calcium per os.

To summarize, the diets recommended range from a general diet with added cod liver oil and tomato juice to a low-residue diet, bland in type, with an ample supply of vitamins and minerals. It is agreed that bland diets are best for alleviating intestinal symptoms, but two difficulties are mentioned in their use, namely, the lack of vitamins and minerals and the patient's unwillingness to accept such diets for long periods of time. Certain foodstuffs are contraindicated because of their direct or indirect effect in increasing intestinal peristalsis.

PRESENT INVESTIGATION

At the time our investigation began, namely, January 1, 1935, the treatment of our intestinal cases was carried on as part of the general food service for the entire institution. The intestinal cases were being fed on a modification of general diet, as follows. No onions or cabbages were allowed; other vegetables were puréed; no pork was allowed, except bacon; desserts were usually milk puddings. Each intestinal case received one-half ounce of cod-liver oil and three ounces of tomato juice per day. These patients were scattered throughout the general wards of the institution and were sometimes difficult to please, and there was a general feeling, based on past experience, that they would not cooperate on any stricter diet regimen for any length of time.

During 1935 many of these intestinal cases were transferred to this service. We kept most of them for some months on exactly the same

diet as had been given them before transfer, and yet in many instances we achieved a weight gain for 3 to 10 months, where formerly the same people had a maintained or losing weight record for 3 to 6 months. The onset of a better weight record was too prompt to assume that at the time of their transfer to this diet service they were at the point of improving. In fact most of them were showing maintained or extending pulmonary disease at the time of their transfer.

The better nutrition was achieved obviously not by diet *per se*, which was unchanged, but by stricter individual attention to the patients. Such attention is possible only where nurses and dietitians can work in unison on a service for these cases. By stricter supervision of the patients we found that some had not previously been taking enough milk. Others had taken too much milk per meal, and consequently left a great part of the meal uneaten on many occasions. Other patients were not eating enough protein. We found that by talking to them and explaining the situation their former dislikes for certain foodstuffs could be overcome. Some patients had occasionally been given eggnogs between meals, and this often prevented their eating the next meal fully.

As time went on we planned a diet called "low-residue diet" and which will be referred to as such. This diet we have used routinely on many cases for the past four years. The details of this diet are given below.

LOW-RESIDUE DIET

Breakfast

Strained fruit juice—50 to 100 grams: orange, grapefruit, pineapple or tomato juice.
Milk—50 to 150 grams.
Bacon—20 grams, or 1 egg. If the patient has a good appetite he is given both bacon and egg.
Bread—10 to 30 grams: white bread or toast, or soda biscuit.
Honey, corn syrup, or clear jelly—20 grams, *e.g.*, crabapple jelly or any jelly without seeds or pulp.
Cream—50 to 100 grams, 32 per cent cream is used for all diets.
Cereal—Cooked cereal, relatively bran-free, 75 to 100 grams (cooked weight).

Dinner or Supper

Soup—A clear stock soup, oxo, or bovril, is used, but if the patient is likely to fill up on soup and leave other parts of his meal it is left off the diet.
Meat—30 to 50 grams: scraped beef, tender roast chicken or lamb, chicken or lamb stew, boiled, baked or steamed fish, sweetbreads and oysters. One egg may replace 30 grams of the above meats.
Potato—50 to 100 grams: baked, mashed or boiled. For variety an equal amount of rice, macaroni or spaghetti may be substituted for the potato.
Vegetable—50 to 100 grams: given only once a day. Puréed peas, carrots, corn, beets and tomato. Squash, asparagus tips and cauliflower need not be puréed.
Bread—10 to 30 grams.
Milk—50 to 150 grams.
Cream—32 per cent, 50 to 100 grams.
Dessert—*For dinner*—an average serving of plain milk dessert, such as custard, junket, sago, tapioca, rice, or ice-cream.
For supper—a serving of sweetened fruit, 50 to 100 grams, such as canned peaches, pears, also apple sauce, bananas, or grapefruit and orange sections, free from membrane.
Sugar—15 to 60 grams per day.
There is no night feeding on the low-residue diet.
Each patient on this diet receives 3 ounces per day of tomato juice, and one-half ounce of cod liver oil.

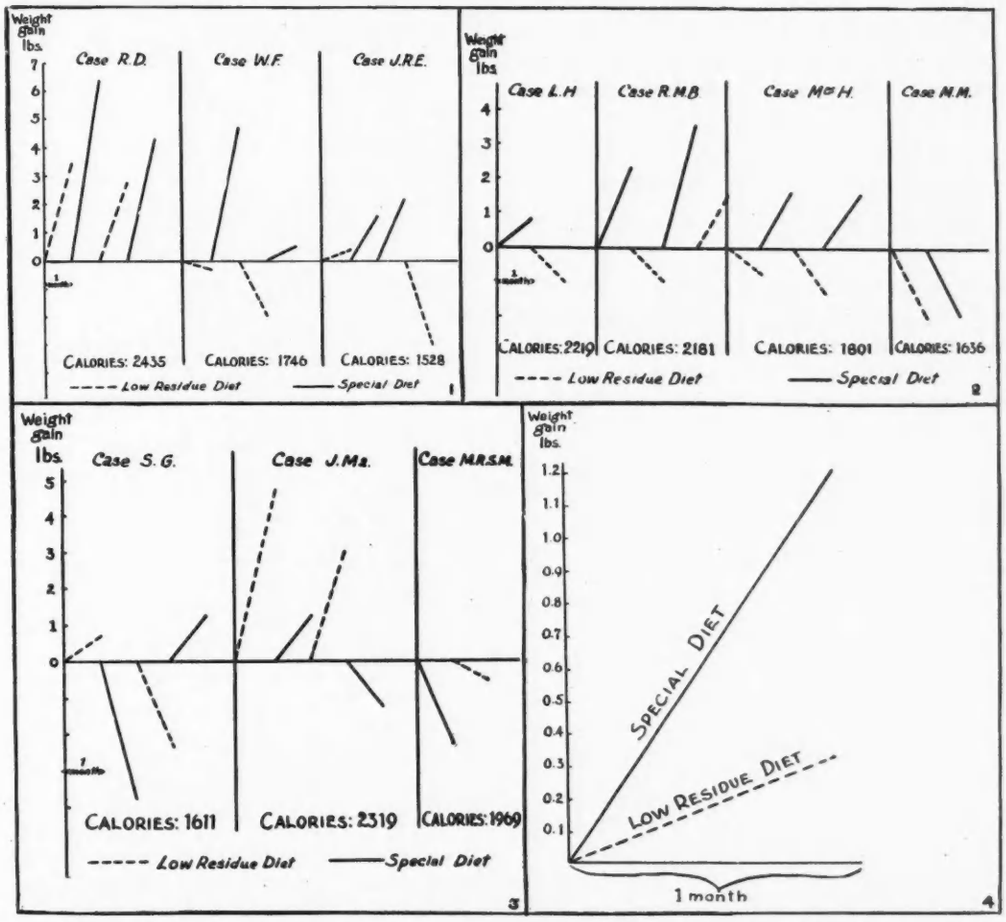
Early in 1935 we had to meet the problem of feeding cases of intestinal tuberculosis who had definite gastro-intestinal symptoms such as nausea, loose stools, colic, pain after eating, or pain after defæcation. We felt that an even more bland diet with smaller feedings would be better than the low-residue diet in relieving such symptoms. In the construction of this blander diet we have kept in mind the point that it must provide an ample supply of vitamins and minerals in addition to the other food elements in a very bland form. At the same time this optimum diet must be one that can be easily prepared and which is suitable for institutional use. In constructing it we have made use of the precooked cereal mixture—pablum, which fulfills the above-mentioned requirements. Our special diet is identical with the low-residue diet in all foodstuffs and proportions, and with servings of the same, including cod liver oil and tomato juice, with the following exceptions: (1) no vegetables are served; (2) the breakfast cereal is 15 grams of pablum, dry weight, mixed with hot water to the desired consistency; (3) the same pablum feeding is served at dinner and supper. The same night feeding at 8:00 p.m. of pablum is given with 50 grams of cream.

It was found that nearly all cases of intestinal tuberculosis would adhere to the dietary regimen as laid down in our special diet. In general our records showed that cases on either low-residue diet or the special diet did better than those on the ordinary ward diet to which had been added cod-liver oil and tomato juice. In most instances the patients showed improvement when changed from the low-residue diet to our special diet. Symptoms related to the gastro-intestinal tract, such as loose stools, colic, pain after eating, and pain after defæcation which could not be controlled by the low-

residue diet frequently cleared up when the patient was placed on our special diet. The special diet in most cases produced a more consistent gain in weight than the low-residue diet, which in turn was more effective, nutritionally, than ordinary diet.

Especially during the first year of our investigation we had to treat many cases of intestinal tuberculosis whose pulmonary tuberculosis was hopeless. Even in such cases we could, using weight records as the criteria, frequently maintain satisfactory nutrition for months by means of the special diet in cases which did not do well on ordinary diet or the low-residue diet.

While we had determined that in most cases the special diet was of greater value than bland diet in bringing about gain in weight, the reason for this was not clear. Were the better results due to a difference in the nutritional constituents of the diets, or were they the result of an extra caloric intake? To settle this point, we began a further step in our investigation. This was to compare the two diets, low-residue and special diet, by giving the one diet for a certain period of time, usually one month, but keeping the calories given per day the same. For example, a patient for a three-day period would have his meals adjusted within the limits of the outlined low-residue diet, so that we knew just how much bread, milk, and butter, etc., he usually ate. Then he was weighed and his meals per day were sent out with a known content for the day of calories, protein, fat, and carbohydrate. This necessitated strict weighing of the day's rations. This same diet per calories, protein, fat and carbohydrates was served each day for one month usually, or sometimes longer. After each meal any food left uneaten was weighed and the calories, protein, fat and carbohydrates uneaten were recorded. The patient was weighed every two weeks and at the conclusion of his period of low-residue diet. Then he was changed over



Charts 1, 2 and 3.—Weight gain per month of patients fed alternately on low-residue diet and special diet. **Chart 4.**—Average weight gain per month of patients fed low-residue diet compared with their gain while receiving same number of calories in the form of the special diet.

to special diet, of the same calories each day, and, as before, food returns were estimated. The patient was kept on the special diet for the same period of time. These diets were alternated in this manner. Sometimes special diet was used first.

During the past fifteen months, ten patients have been investigated in this way. The results for these ten cases are presented in graphs showing the grams of protein, fat and carbohydrate fed, and the weight records. Chart 1 shows the data for three cases, namely R.D., W.F., and J.R.E. This shows the weight records for four periods of one month each for each case, the two diets — low-residue and special diet—alternating, one month low-residue then one month special diet, and so on.

CASE R.D.

	Protein		*Fat*		*Carbohydrate*
Special diet	79.9	x	157.0	x	175.6
Low-residue diet	73.4	x	131.5	x	194.0

Calories returned on above diets

Month 1	*Month 2*		*Month 1*	*Month 2*
Special none	1031.0	Low-residue	154.0	539.0

CASE W.F.

	Protein		*Fat*		*Carbohydrate*
Special diet	58.1	x	122.6	x	102.6
Low-residue diet	54.9	x	105.7	x	144.2

Calories returned on above diets

Month 1	*Month 2*		*Month 1*	*Month 2*
Special 60.0	533.4	Low-residue	560.0	108.0

CASE J.R.E.

	Protein		*Fat*		*Carbohydrate*
Special diet	61.3	x	99.9	x	96.1
Low-residue diet	59.0	x	104.9	x	89.3

For this case there were no food returns on either the low-residue or special diet.

Chart 2 shows the data for four cases, namely, L.H., R.M.B., Mrs. H., and M.M.

CASE L.H.

	Protein		*Fat*		*Carbohydrate*
Special diet	71.4	x	143.0	x	161.7
Low-residue diet	68.4	x	135.0	x	182.1

Calories returned on above diets

Month 1		*Month 1*
Special 209.5	Low-residue	220.0

It is only fair to note that this patient had one month of special diet weighed before the month of special diet shown, with equal weight gain as for the month of the graph, and then had two more months of special diet with a maintained weight following the month on low-residue diet. In other words, he was on the strict weighed diet regimen for four months but was willing to take the low-residue diet for only one month of the four.

CASE R.M.B.

	Protein		*Fat*		*Carbohydrate*
Special diet	71.4	x	143.0	x	152.2
Low-residue diet	66.4	x	133.5	x	177.9

Calories returned on above diets

Month 1	*Month 2*		*Month 1*	*Month 2*
Special 112.5	449.7	Low-residue	534.5	2005.9

CASE MRS. H.

	Protein		*Fat*		*Carbohydrate*
Special diet	57.5	x	115.0	x	134.1
Low-residue diet	70.7	x	100.4	x	153.8

Calories returned on above diets

Month 1	*Month 2*		*Month 1*	*Month 2*
Special none	none	Low-residue	343.0	227.7

CASE M.M.

	Protein		*Fat*		*Carbohydrate*
Special diet	55.9	x	109.5	x	107.2
Low-residue diet	68.7	x	98.8	x	144.8

Calories returned on above diets

Month 1		*Month 1*
Special 1902.6	Low-residue	929.6

This case continued on special diet, same calories, 4 months more with a gain of 4½ pounds.

Chart 3 illustrates the data for three cases, namely, S.G., J.M.$_2$, and M.R.S.M.

CASE S.G.

	Protein		*Fat*		*Carbohydrate*
Special diet	49.5	x	105.5	x	116.1
Low-residue diet	53.7	x	93.8	x	138.2

Calories returned on above diets

Month 1	*Month 2*		*Month 1*	*Month 2*
Special 3117.6	1395.9	Low-residue	2479.9	1735.6

This case had progressive extension of pulmonary tuberculosis throughout the above four months.

CASE J.M.$_2$

	Protein		*Fat*		*Carbohydrate*
Special diet	64.9	x	154.3	x	167.2
Low-residue diet	78.7	x	135.3	x	196.8

Calories returned on above diets

Month 1	*Month 2*		*Month 1*	*Month 2*
Special 96.0	1589.0	Low-residue	1925.5	none

CASE M.R.S.M.

	Protein		*Fat*		*Carbohydrate*
Special diet	61.5	x	131.5	x	135.1
Low-residue diet	63.5	x	124.0	x	149.8

Calories returned on above diets

Month 1		*Month 2*
Special 440.4	Low-residue	1748.4

For the ten cases shown above special diet gave better results in six cases, namely, cases R.D., W.F., J.R.E., R.M.B., L.H., and Mrs. H.

Low-residue diets gave better results in two cases, namely, cases J.M.$_2$, and M.R.S.M.

In two cases either diet seemed to produce equal results. These were M.M., and S.G.

In Chart 4 is shown the average weight gain per month of the ten patients shown separately

in Charts 2, 3 and 4, who were alternated on low-residue and special diet. While the average weight gain for the one month period on the low-residue diet was 0.34 pounds, the same patients on the special diet made an average gain of 1.2 pounds, three and a half times as great.

CONCLUSIONS

The treatment of ulcerative intestinal tuberculosis is not only a medical problem in itself but for any sanatorium is an institutional problem. Because the intestinal ulceration is secondary to pulmonary tuberculosis, which may be hopeless, and because some cases of intestinal involvement recover without any special attention to diet there is not sufficient appreciation of the vital need of giving patients with intestinal tuberculosis a strict plan of diet.

Any reasonable diet regimen with proper supervision and check on individual errors in the taking of the same is definitely shown in this investigation, to supply better nutrition than the same diet regimen without special and detailed supervision on the part of physician, dietitian and nurses.

The best diet for relieving intestinal symptoms and for supplying nutrition, as shown by gains in weight, or prevention of loss of weight, is a diet which we have described, that is relatively bland, low in residue, with sufficient protein, ample in vitamins and minerals, with four feedings per day. In this diet ample supplies of vitamins and minerals have been obtained by the incorporation of cod liver oil, citrus fruit juices, tomato juice, and pablum.

Evidence has been presented in this paper showing that such a diet supplies better nutrition on the same calories per day than another diet, which, although low in residue and containing the same calories, has a lower vitamin and mineral content, is less bland, and has only three feedings per day.

It is recommended that this blander diet should be used in all intestinal cases except in the following exceptions: (1) where the intestinal lesion does not need any treatment at all, and (2) where with the onset of intestinal tuberculosis there occurs a spread of disease in the lung which is known to be the beginning of a continual, progressive pulmonary spread. It is often very difficult to identify such exceptions at the time the intestinal tuberculosis is diagnosed by x-ray.

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ASPIRIN AS A GARGLE.—The value of antiseptic gargles has always been more or less suspect. Prof. David Campbell in his "Handbook of Therapeutics" says bluntly: "Gargles are really of very little use in throat affections, as they do not reach beyond the anterior pillars of the fauces." Some grant that they are often soothing to the patient, but say that to be of any value they must be hot, when they act merely as fomentations; what the hot water contains is of little moment so long as it is harmless. Still others back their own fancy mixture of phenol and bicarbonate, or what you will. Lately the curious practice of employing powdered aspirin stirred in lukewarm water as a gargle has been gaining in popularity. It is true that aspirin in solution has an antiseptic power about equal to that of phenol, but since acetylsalicylic acid is non-volatile and is soluble only to the extent of 1 in 300 in cold water, though it is more so in warm water and possibly in saliva, there seems to be little to recommend it as an antiseptic in a gargle. The aspirin gargle is esteemed also as a local analgesic in sore throat and after tonsillectomy, but the relief of pain may be partly due to the central action of the drug after absorption, for the instructions are explicit that the aspirin should eventually be swallowed. A totally unexpected incrimination of aspirin when used in this manner comes from a chemical study by Dott, who has investigated the effects of aspirin solutions on the teeth. His brief paper demonstrates beyond doubt that appreciable quantities of the calcium of the teeth go into solution when an aspirin gargle is used. Dott's analyses, confirmed substantially by the independent observations of Dr. J. C. Thompson of the clinical laboratories of the Edinburgh Royal Infirmary, suggest that aspirin used as a gargle is of limited value.—*The Lancet*, 1940, **2**: 526.

MANAGEMENT OF THE NUTRITIONAL ANÆMIA OF INFANCY*

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THE classification of the anæmias of infancy is a lengthy one, for they constitute a large field which can only be referred to in part. It is intended, therefore, to deal merely with one type, namely—nutritional anæmia of infancy, commonly referred to as iron-deficient anæmia, or hypochromic anæmia.

With the accepted view that iron deficiency is the underlying factor, the management of such anæmia should be directed toward iron-sufficiency. Accordingly, with this in mind, an attempt is made to present and to evaluate some of the more recent concepts of therapy and dietary management. Iron constitutes one of the most effective and possibly the commonest of all forms of medication employed by clinicians dealing with the younger age-group. The frequency with which iron is used is ample evidence of the prevalence of anæmia of infancy, and points to an ever increasing confidence in the efficacy of this form of treatment.

Physiological anæmia.—In order to recognize various grades of anæmia a standard hæmoglobin curve (Chart 1) has been established by Mackay[10] which represents an optimum hæmoglobin level. These figures are for normal breast-fed infants given iron at 4 months of age. At 6 months the hæmoglobin was raised to 86 per cent, which level was maintained throughout the first year. Control groups were included for comparison. According to this standard 70 per cent of infants in her series in a later investigation were anæmic. A lower incidence is reported by other investigators.

Following the high hæmoglobin content at birth a rapid destruction of red blood cells sets in, with a consequent fall in hæmoglobin in the new-born period. Incidentally, this iron liberated by hæmolysis is stored and constitutes an available reserve. The low hæmoglobin reached in the second month is the so-called "physiological anæmia", after which there is a gradual rise in hæmoglobin during the third and fourth month which increased up to the sixth month. From the sixth to the twelfth month the hæmoglobin tends to fall slightly. During the second year it rises slowly until normal values are reached, attaining the adult level at adolescence. It must be born in mind that the average hæmoglobin of 75 per cent is considered normal for infants under 2 years of age (Chart 2), according to Haden.[5]

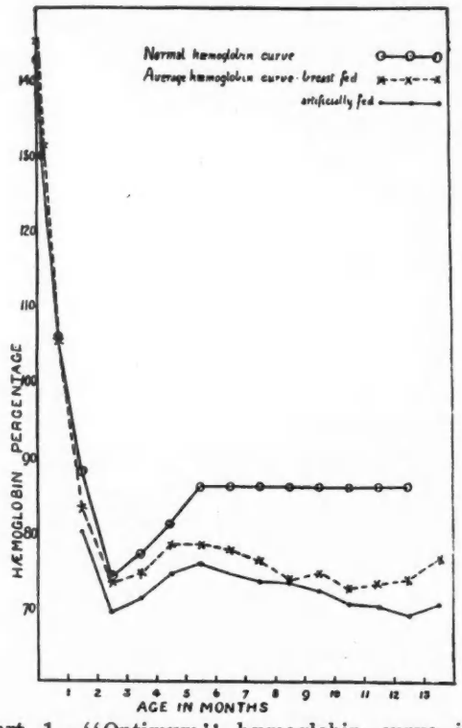

Chart 1.—"Optimum" hæmoglobin curve in the first year of life from early iron administration (Mackay[10]).

Depletion of iron reserve.—The factors concerned in the causation of nutritional anæmia are varied. Consequently, it will be sufficient to focus on certain aspects relevant to its production which may be influenced by treatment. The underlying principle in nutritional anæmia is the iron deficiency due to depletion of the iron reserve. There seems to be a general agreement that iron is stored in the fetus throughout its uterine existence, possibly more so in the later months of pregnancy. The infant must rely on this reserve supply, aided by the iron deposited as a result of hæmolysis which occurs shortly after birth. This reserve gradually becomes depleted, since the intake of iron either from

* Read at the Seventy-first Annual Meeting of the Canadian Medical Association, Section of Pædiatrics, Toronto, June 20, 1940.

breast or cows' milk is inadequate, so that by the end of the sixth month there is an exhaustion of the available reserve iron. This contention is adequately substantiated by histological and chemical studies.[6, 22] Fundamentally this is the basis of iron-deficient anæmias. Consequently, when it has been established that a study of the hæmoglobin content of the blood indicates a definite or borderline anæmia the administration of some form of iron is indicated. This may be effectively started as early as the third month, as it has been shown by Josephs[6] that iron therapy is ineffective prior to that age. By early administration of iron during the first year, Mackay[9] has shown that the morbidity rate is reduced as much as 50 per cent. There is also a significant gain in weight of from 2½ to 3 pounds in infants receiving adequate iron therapy over a 3 months' period.

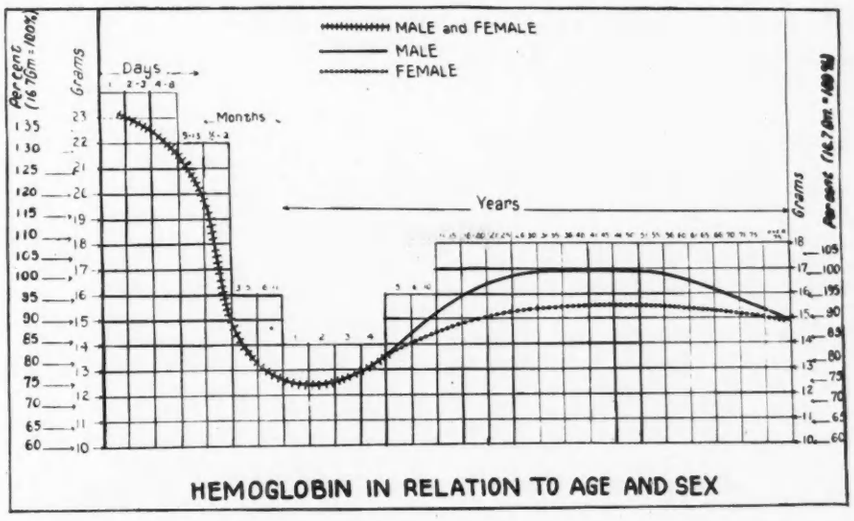

Chart 2.—A hæmoglobin of 75 to 80 per cent considered normal during infancy (Haden[5]).

Maternal anæmia.—The relationship of maternal to infant anæmia is of great importance. Amongst influential factors such as birth-weight, rate of growth, and infections, which are beyond our control, there is one factor, namely, the influence of maternal anæmia on infant anæmia, which definitely lends itself to correction. This factor has received a minimum of attention. However, Strauss[18] referred to this particular problem, and said that infants born by women suffering from hypochromic anæmia exhibited a normal blood picture at birth, but developed moderate to severe degrees of anæmia during the first year of life. He went on to show that this infant anæmia may be prevented by the administration of iron to the mothers during pregnancy. This is supported by Gottlieb and Strean,[4] working with a large group of infants in Montreal. They compared the offspring of mothers receiving adequate iron therapy with infants of a group of non-treated mothers. A significant average gain of 31 per cent of hæmoglobin was found at the end of an 8 month period in infants born of mothers receiving iron therapy. Consequently, it becomes apparent that the treatment of anæmic mothers is the first important step in the prevention of iron deficient anæmia in the infant.

TREATMENT

In regard to active treatment some form of iron is indicated. The choice of an iron preparation is of the utmost importance. Each clinician has his own favourite which through experience he has found most satisfactory. For an infant the selection should depend on ease of administration, solubility, tolerance, effectiveness, and inexpensiveness.

Amongst the inorganic preparations, iron and ammonium citrate is still one of the favourites, as it fulfils most of the requirements aforementioned. Although this salt is in the ferric state it is readily converted into the assimilable form on ingestion. One of the most convenient ways of administration is by its addition to the usual milk feeding, or it may be given in water or fruit juice, as the following.

℞	Ferri et ammon. cit.	gr. 10
	Cupri sulphatis	gr. 1/64
	Syrupi simplicis	ʒ 1/2
	Aquæ	ʒ 1/2

A few drops gradually increased to one drachm 3 to 5 times daily are usually well tolerated. Doses much in excess of the above may be employed. Snelling[16] recommends doses from 60 to 120 grains daily, explaining that small amounts of iron and ammonium citrate will be changed gradually to ferric chloride or the unavailable form by reducing substances in the diet, whereas with larger doses the proportion of ferrous salt is increased.

During the past decade clinical data have accumulated substantiating the use of the supple-

mental addition of copper to iron therapy, while a minority contends that copper does not seem to enhance the rôle of iron. Although copper is not a constituent in the formation of the hæmoglobin molecule its rôle as a catalyst is generally accepted. Elvehjem, and co-workers[3] were of the opinion that the addition of copper caused the hæmoglobin content to rise more rapidly and to reach a higher level. They felt that there was ample evidence to prove that iron was incapable of raising the hæmoglobin to the average level, and inferred that supplemental copper was necessary to stimulate an optimum response. From experimental and clinical evidence one must conclude that copper still deserves recognition in the treatment of nutritional anæmia of infancy.

Ferrous vs. ferric compounds.—Although iron and ammonium citrate and similar compounds have been used with success ferrous preparations have been advocated in recent studies. It is believed that only iron in the ferrous state is absorbed from the intestinal tract, its effectiveness depending on the liberation of ferrous ions. Further, iron in the hæmoglobin molecule is present in the ferrous form. However, there are certain disadvantages accompanying the use of ferrous salts. The most significant is the readiness with which they deteriorate when in solution. The advantages on the other hand lie in their ease of absorption, rapid response, and smaller dosage.

The effectiveness claimed for ferrous salts is clearly brought forward when we consider the following table as originally compiled by Witts (See Table I). The percentage utilization of

TABLE I.

Preparation	*Effective daily dose, grains*	*Iron content, mg.*	*Utilization of iron, percentage*
Metallic:			
Reduced iron	20–90	1,200–5,000	0.5–2
Ferrous:			
Ferrous chloride	4–8	100–200	12.5–25
Ferrous sulphate	9–12	180–240	14.0
Ferrous carbonate (as Blaud's pill)	45–60	300–400	8.0
Ferric:			
Ferric ammonium citrate	60–120	800–1,600	1.5–3

Greater utilization with ferrous compounds considered advantageous—Haden.[5]

ferrous chloride, ferrous sulphate in comparison with iron and ammonium citrate, is clearly demonstrated.

Syrup of ferrous chloride is favoured on account of its rapid effect and utilization. It is not a palatable preparation, and cannot be placed in milk feedings because of curdling. It also deteriorates in a few weeks, approximately a month. Lucas and Summerfeldt[8] in a recent work used soluble ferrous chloride with added copper.

Ferrous sulphate. Parsons[12] was inclined to feel that ferrous sulphate was the most efficacious. He recommended the following prescription to be given three times daily.

℞	Ferrous sulphate	gr. 4
	Water q.s.	
	Simple syrup	dr. 2

Josephs,[6] again citing from his excellent monograph, stated that the greater value of ferrous iron has not yet been demonstrated in anæmia of infancy. In keeping with this statement Stephenson[17] compared a group of infants using a daily dose of 30 grains of iron and ammonium citrate (340 mg. metallic iron) to controls who were each given 6 grains of ferrous sulphate (about 78 mg. metallic iron). In her work she suggested that ferrous iron in the above dosage was a little more quickly effective than the ferric, and concluded that the ferrous iron proved to be as effective as the ferric.

The saccharated ferrous carbonate is widely used. It may be conveniently prescribed in tablet or powder, given in milk, cereal, or fruit juices, the latter form being the least expensive.

Available iron vs. total iron content. — Although iron is to be considered foremost in the treatment of nutritional anæmia, dietary changes are essential. An over-indulgence in milk is curtailed. The timely addition of solid food must be introduced in the light of recent clinical and experimental evidence. Some interesting facts have been lately disclosed concerning the availability of iron in various food stuffs. One of the most recent and frequently quoted works is that of Summerfeldt.[20] Incidentally it was pointed out that as much as 25 to 50 per cent of the soluble iron in food goes into solution in the cooking water and is lost. This point is of great practical value.

A similar work on the availability of iron, using a different method, was later published by Kohler and his associates.[7] Such works are revolutionary and of utmost importance. In future, iron-containing foods will be assessed from the amount of soluble iron and not from the total iron content as heretofore.

Value of solid food in nutritional anæmia.—Is the early introduction of solid food an aid in the

prevention of anæmia of infancy? Monypenny[11] has found that the addition of egg, pablum, and canned sieved vegetables at one month of age did not increase the weight or hæmoglobin during the first five months over and above the values obtained in infants receiving milk mixtures alone. In keeping with this, it is claimed by experienced clinicians that the too early introduction of solid food is a factor resulting in gastro-intestinal disturbances encountered in later childhood. Elvehjem *et al.*,[2] and associates show that their low hæmoglobin values recorded during the first 6 months were not prevented to any appreciable extent by the feeding of an adequate diet of natural foodstuffs; however, the hæmoglobin values of children on the special diet began to increase at an earlier age.

Again in regard to early vegetable feedings we have the opinion of Schultz[14] and his associates. Their data indicated that the influence of vegetable feeding on mineral retention including iron was negligible in the case of the very young infant. Any favourable effect that vegetable feeding may produce must be attributed to such factors as vitamin content and others still unknown. Balance experiments by the same authors revealed that anæmic infants were not able to utilize the iron of spinach.[15]

Cereal usually constitutes one of the early additions to the diet. Pablum contains minerals, vitamins and iron in available form. Its use has resulted in a marked increase in hæmoglobin in normal children, as reported by Ross and Summerfeldt.[13]

Tisdall and his associates[21] found the nutritional value of spinach was greatly over-rated, and stated that cooked spinach and canned tomatoes were approximately of equal value as a source of iron for the prevention and cure of nutritional anæmia, despite the fact that spinach contained three times the total iron content of tomato. This can be explained on the basis that cooked spinach as ready to serve and canned tomatoes contain the same amount of soluble iron for hæmoglobin formation.

Liver was considered not so long ago as having little or no effect on the secondary anæmias. The evidence is now strongly in favour of liver as being one of the most important foods in its prevention and treatment. Its protein, iron and copper content, and possibly unknown factors, are responsible for hæmatopoiesis and hæmoglobin synthesis. Liver extract is now being used in some of the larger clinics. Cooley[1] preferred whole liver extract to the so-called "secondary" extract.

From the aforementioned data we must not be over-expectant of hæmoglobin regeneration from the too early addition of foods presumably rich in iron. This evidence strongly emphasizes that iron still constitutes our most effective weapon in the prevention and treatment. An absolute increase in hæmoglobin necessitated by growth and general metabolism can be more satisfactorily fulfilled by the proper administration of iron.

Vitamins.—The rôle of vitamins has been the object of much clinical investigation. Summerfeldt and her co-workers[19] have shown that the vitamin B complex incorporated in a special cereal and biscuits increased the hæmoglobin content of normal children. Liver and some liver extracts are high in this vitamin. The addition of other vitamins are not specific but contribute to the general well being so essential to optimum hæmatopoiesis. Sunshine undoubtedly plays a part but ultra-violet irradiation has not gained a reputation in either the prevention or cure of the nutritional anæmia of infancy.

Transfusion.—A word about the part played by transfusion is of course indispensable. Infants with severe degrees of anæmia should receive one or more transfusions as the patient's ability to combat infections is materially reduced, and this defect is often disastrous. Transfusion should be given for a rapid response, thus providing extra resistance and stimulating bone-marrow production. Transfusion when given early to markedly anæmic infants in severe infections as pneumonia is often a life-saving measure.

SUMMARY

1. Physiological anæmia was uninfluenced by iron medication.

2. Early antianæmic therapy prevented depletion of iron reserves.

3. Treatment of anæmic mothers aided in the prevention of anæmia in the infant.

4. Iron constituted our most effective weapon in combating nutritional anæmia.

5. Large doses of ferric salts with copper were used effectively.

6. Ferrous compounds proved to be as effective as the ferric.

7. Iron-rich foods were assessed from the amount of soluble iron available.

8. Solid food was inadequate as a source of iron for hæmoglobin regeneration.

9. Transfusion was considered advisable in severe grades of anæmia.

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UPPER ABDOMINAL PITFALLS: DIFFERENTIAL DIAGNOSIS AND SURGICAL TREATMENT*

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MY attention was attracted to the importance of this subject by the sudden death of a colleague after a short history of recurring attacks of upper abdominal pain. Three eminent cardiologists proclaimed his heart not at fault. One surgeon diagnosed gall-bladder disease. On the same day that he died from coronary thrombosis I saw in consultation a man who had been in bed five weeks with what was thought by a very competent medical man to be coronary thrombosis. The day I saw him his gall bladder had ruptured into the free peritoneal cavity as a result of gangrene due to five weeks' obstruction of the cystic duct. These two cases serve to illustrate the difficulty in differentiating between the symptoms of extra and intra upper abdominal disease, and also the tragedy that attends improper treatment. The first responsibility is to exclude extraperitoneal and other non-surgical lesions that produce acute upper abdominal symptoms.

Some of the greatest tragedies encountered in practice occur in the upper abdomen. Great care must be exercised to differentiate between intra- and extra-peritoneal disease, for if an abdomen be opened by mistake when extraperitoneal disease is present, death may result; on the other hand, procrastination in the face of intraperitoneal disease demanding surgery will increase the mortality.

The increasing incidence of heart disease, especially coronary thrombosis, has made the profession very much on the alert to recognize it. Dr. J. Oille[8] in a recent article on coronary thrombosis stated: "The mistakes that are made now are the reverse of those made ten to fifteen years ago. Then, coronary thrombosis was not diagnosed when it should have been, now, it is diagnosed frequently when it should not be, in cases that obviously have pain due to gall bladder or other abdominal origin." The cardiac area for pain includes the epigastrium, and heart disease, therefore, frequently causes upper abdominal symptoms from pain originating in the heart muscle itself, from passive congestion of the spleen and liver, or from emboli thrown off by the heart and lodging in the vessels of the upper abdomen.

The early symptoms of heart disease often cause patients to believe that they are suffering from indigestion. In early coronary disease characteristically the patient is able to exercise on an empty stomach without distress, while the same amount of exercise undertaken after eating, or particularly overeating, causes distress or pain often located in the epigastrium and radiating up the sternum into the neck and often the teeth. This distress is variously described as a "choking sensation", "pressure pain", "squeezing or filling up", or a feeling of "gas on the stomach", and when relieved by belching the patient is more convinced than ever that it is due to indigestion. Soda very

* Read at the Seventy-first Annual Meeting of the Canadian Medical Association, Section of Surgery, Toronto, June 21, 1940.

often gives that type of patient more relief than nitroglycerine, and since Butch, McGowan and Walters[1, 2, 3] have shown that nitroglycerine will relieve the pain of gall-stone colic and common-duct spasm, it has greatly added to the physician's responsibility in these already difficult cases. Many of these patients have discovered that the attacks are less frequent if they adhere to a light diet of easily digested foods.

Emboli lodging in abdominal organs produce clinical pictures which may mimic almost any acute surgical disease of the abdomen, and should always be considered, particularly in cases with an abrupt onset and a marked degree of shock. I have seen one patient operated on for an acute appendicitis and another diagnosed as having renal calculus because of a mesenteric embolism. Pleurisy is a frequent diagnosis following infarction of the spleen. Acute pancreatitis or acute intestinal obstruction are often suspected when the mesenteric vessels become occluded.

The abdominal crises of lead poisoning, the gastric crises of tabes dorsalis, diaphragmatic pleurisy, and incipient or central pneumonia can mimic upper abdominal intraperitoneal disease, and must always be excluded before a diagnosis of intraperitoneal disease is made. A carefully-taken history and a complete physical examination which includes an analysis of the blood and urine should be given every patient presenting acute abdominal symptoms, and an electrocardiographic examination, certainly, if in doubt of the cardiac origin of the pain. Dr. Oille advises keeping the patient in bed three or four weeks if in doubt as to the cardiac origin when no electrocardiograph is available.

If we are able to exclude extraperitoneal disease we are faced with the problem of making a correct pre-operative diagnosis of an intraperitoneal lesion. This is often almost impossible, and delay must be avoided if we are to lower the mortality rates attendant upon these conditions. Every hour of delay increases the mortality of perforated ulcer, for example, and allows the rapid progression of pathological changes in the gall bladder. Fortunately, the same incision will permit the surgeon to deal with any lesion found in the upper abdomen.

Perforated peptic ulcer. — The diagnosis of perforation is usually easy, the long history of periodic attacks of indigestion, relieved by food and soda, indicating the presence of peptic ulcer. However, perforation may occur as the initial symptom in a few cases. The pain comes on suddenly as a rule, and is of such severity that the victim is "dropped in his tracks". Nausea is present but only about 40 per cent of these patients vomit. Shock at first is present to a marked degree, evidenced by cold, clammy skin with beads of perspiration on the brow; rigidity is early, board-like, and in the vast majority of cases remains after the initial shock passes off, which may be from a few minutes to an hour, then the patient is able to get up and walk in relative comfort. This is the stage when the physician first sees him, and the unwary may easily be misled by the comfort of the patient, the calm expression, normal temperature and pulse, and, in a few cases, the board-like rigidity may be absent or doubtful, but a careful history and abdominal examination will bring out that trinity of symptoms and physical findings enumerated by Graham[5] which are indicative of an intraperitoneal tragedy, namely, the association of pain and tenderness; one point of maximum tenderness; aggravation of the distress if the patient turns over in bed. With perforation, the pain is very often diffuse but, if they are not too shocked, many patients will complain of the greatest amount of pain in the epigastrium to the right of the mid line, and their distress is increased by turning over.

Differential diagnosis deals mostly with (1) acute appendicitis; (2) acute hæmorrhagic pancreatitis; (3) coronary thrombosis; (4) mesenteric thrombosis; and (5) acute cholecystitis.

Appendicitis may be simulated by the duodenal contents running down the right paracolic gutter, collecting in the right iliac fossa, and causing local symptoms.

Atypical *coronary thrombosis* can simulate an acute abdominal disaster very closely, but the onset of pain is more insidious than that of perforation, and it radiates up over the left chest; rigidity, if present, is very slight; there is no point of maximum tenderness; the pain and tenderness are not associated, and pain is not increased by turning in bed. Connell[4] states that one of the most valuable differential points is the presence of dyspnœa, which is uncommonly found in abdominal lesions.

When perforation is present these patients very seldom reach hospital in less than six hours; mortality increases rapidly as time passes. Pa-

tients are often admitted in very poor physical condition to stand an anæsthetic and laparotomy, and any delay after admission to administer fluids, such as glucose, blood, etc., is well compensated for by the improved condition of the patient.

Spinal is the anæsthesia of choice in these cases, since it produces a quiet abdomen and lessens thereby the spread of the duodenal contents. At this operation saving the patient's life is our only responsibility, so the leak is closed as quickly and with as little trauma as possible, and no effort made to deal with the ulcer. I have used Graham's method of closing an ulcer for some time and have found it very satisfactory. Three interrupted sutures tied over an omental fat graft covers the hole. Drainage is not necessary unless gross necrosis is present, because cultures taken from the abdomen in the first twelve hours are either sterile or show avirulent organisms.

Acute pancreatitis.—This is a rare disease and no surgeon ever meets with many cases. The condition is seldom diagnosed until the abdomen is opened. Fitz's classification of gangrenous, hæmorrhagic and purulent types may only relate to a matter of degree, but nevertheless each has a very distinct clinical picture, corresponding with their pathological varieties, according to Walton.[9] The average age is 40, usually stout subjects with a past history of milder attacks. These former attacks may have been caused by milder degrees of pancreatitis or have been due to gall stones, with which condition pancreatitis is very commonly associated. Differential diagnosis from perforated ulcer, acute intestinal obstruction, and intraperitoneal infection is necessary.

With the gangrenous type the pain is sudden, agonizing and continuous, so severe that the patient may faint, and in this respect resembles perforation. Vomiting is continuous without relief. Pain is deep in the epigastrium and soon may pass to the left shoulder. When medical aid arrives the patient is usually in a state of profound collapse, rapid pulse, subnormal temperature, cold, clammy skin with a certain amount of cyanosis, a phenomenon which has never been explained. This picture resembles perforation but the characteristic board-like rigidity is absent. There is deep tenderness in the epigastrium, but no distension is present in the early stages. If allowed to go on, death ensues in two or three days.

The hæmorrhagic type is the most common. It resembles obstruction more closely, with cramping pains across the upper abdomen, continuous vomiting of dark brown material less fæcal in character than that found with obstruction. Distension is less, but more tenderness is usually present than with obstruction. Constipation is not so complete.

Acute cholecystitis.—This is an acute manifestation of a chronic condition, and in 95 per cent of cases is caused by calculous obstruction of the pouch of Hartman or cystic duct. It commences with sudden pain, which, in typical cases, is located in the epigastrium or right hypochondrium, and radiates either around the right costal margin or straight through to the back under the right shoulder blade or mid-scapular region, in other words, the classical pain of gall stone colic.

If the patient is not too sick, a history can usually be obtained of a long, continuous, day by day, flatulent type of dyspepsia, essentially one of intolerance to three types of food, fats, coarse vegetables, and sour fruits, as pork, boiled cabbage, raw apples. This distress comes immediately after meals in contra-distinction to the midmeal distress of ulcer. A history of painful episodes located in either the epigastrium or right upper quadrant can often be obtained, ranging from transient mild discomfort to the agonizing colic induced by the migration of stones. In typical cases the diagnosis is not difficult, but the localization and radiation of pain may not always be so striking. Pain may be felt in the left hypochondrium or in the sternum, and it is possible to have a marked degree of cholecystitis without dyspepsia. Cases exhibiting such atypical symptoms simulate coronary thrombosis and angina very closely and diagnosis will often have to wait corroborative evidence; possibly only an electrocardiogram will decide the issue, and then not always.

Gall-stone colic subsides spontaneously or is soon relieved by a hypodermic of morphine. The difficulty in differentiating between angina pectoris and gall-bladder pain is increased since Butch, McGowan and Walters have demonstrated the relief of gall bladder and common duct pain with amyl nitrite. They also demonstrated an increase in common-duct spasm and pain by administering morphine. If, however, a stone becomes impacted in the pouch of Hartman or the cystic duct the symptoms of biliary colic will soon pass into the characteristic symptoms of acute cholecystitis; vomiting soon follows but gives little relief; the temperature rapidly rises

to 102 or 103°; there is constant severe pain in the right hypochondrium which radiates over the epigastrium and often down the right iliac fossa and through to the back. When a stone becomes impacted in the pouch of Hartman or cystic duct the flow of fluid from the gall bladder is stopped and the venous and lymphatic circulation is also mechanically obstructed; marked œdema of the gall bladder occurs followed by gangrene and perforation in a much higher percentage of cases than is generally believed. Bacteria play no part in this early condition, even though the temperature may rise to 102° with a leukocytosis of 15,000. Reports from many observers show sterile cultures in a very high percentage of these cases.

DIFFERENTIAL DIAGNOSIS

Acute obstructive appendicitis, leaking peptic ulcer, acute pancreatitis, perinephritic abscess and coronary thrombosis are the conditions that must be taken into consideration in making a diagnosis.

In the early stages, pain and tenderness are diffuse and there is a widespread rigidity, but with careful palpation it is generally possible to determine that the physical signs are more marked in the right hypochondrium than in the right iliac fossa, the rigidity is not so board-like as with ruptured ulcer. The past history of a continuous type of flatulent dyspepsia is different from that in the periodic attacks of indigestion so characteristic of ulcer. There is rarely the same tenderness or rigidity of the recti muscles with perinephritic abscess, and if a tumour is present it can generally be felt to pass back into the loin and does not move on respiration. The same past history will be present with pancreatitis, but very little tenderness and rigidity are present. Connell states that: "Cardiac pain may suggest gall-bladder disease (either gall-stone colic or suppurative cholecystitis) more likely coronary thrombosis than angina pectoris." He also states that, "Patients with undoubted gall-bladder involvement have attacks of coronary thrombosis far too frequently for the association to be coincidental."

Until about five years ago the profession was generally in accord with the belief that a gall-bladder operation never became an emergency, but today the opposite view is being entertained by most surgeons. According to Heuer,[6] 20 per cent of acute gall bladders become gangrenous. Alexander[7] reported 20 cases of ruptured gall bladder, 60 per cent of which were localized, and 40 per cent ruptured free into the peritoneal cavity. Immediate operation is advocated to prevent gangrene, and also because the removal of the gall bladder is made easier at this early stage due to the subperitoneal œdema surrounding the viscus.

My experience of handling 51 cases of acutely obstructed gall bladders, in patients ranging in age from 17 to 77 years, with only one death, the only case that was not operated on early, along with a review of the literature, have convinced me that the primary pathological lesion in the "acute gall bladder" is not a septic process but an interference with the blood supply to an intraperitoneal viscus, caused mechanically in 95 per cent of cases by a stone impacted in the cystic duct, and if this obstruction is relieved before infection sets in, the present mortality can be greatly reduced, a higher percentage of complete cures can be assured, because it has been shown that cholecystectomy can be done much more often in the early stage than later. Less suffering before the operation can be promised, and at least one week's shorter stay in hospital after a cholecystectomy than after drainage. Each case, of course, demands individual consideration as to optimal time for operation, but, in my experience, symptoms resulting from a gall bladder obstructed for two days or more will not subside completely under any treatment except operation.

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RÉSUMÉ

Dans les syndrômes abdominaux supérieurs il est de toute nécessité de rechercher si l'agent causal est extra ou intrapéritonéal afin d'intervenir utilement s'il y a lieu. Les organes de la cavité thoracique seront interrogés minutieusement car les plèvres, le cœur et les vaisseaux thoraciques sont souvent le siège de syndrômes simulant une maladie abdominale. L'ulcère peptique perforé est facilement reconnu par la triade de Graham: douleur; localisation de la sensibilité maxima en un point fixe; exacerbation de la douleur si le malade se retourne dans son lit. Au cas de perforation la douleur

a son maximum à l'épigastre, à droite de la ligne médiane. Le diagnostic différentiel se fera surtout avec l'appendicite aigue, l'hémorrhagie du pancréas, la thrombose coronarienne, la thrombose mésentérique et la cholécystite aigue. Voici les éléments principaux du diagnostic: les signes appendiculaires (d'emprunt) ne surviennent qu'au cas de perforation de l'ulcère; la dyspnée n'est pas fréquente dans les lésions abdominales; les affections aigues du pancréas sont très douloureuses et s'accompagnent de vomissements incessants; les affections de la vésicule biliaire s'apparentent davantage à la crise de colique hépatique et ont une longue histoire de malaises antérieurs. Ajoutons que dans l'appendicite aigue la rigidité musculaire est moins marquée que dans l'ulcère perforé. Les affections aigues de la vésicule biliaire doivent être opérées sans tarder. JEAN SAUCIER

COMBINED NUPERCAIN SPINAL AND CYCLOPROPANE ANÆSTHESIA*

BY RICE H. MEREDITH

Toronto

THE anæsthetist is called upon to serve two masters, the surgeon and the patient, and particularly is this the case when the operative site is in the upper abdomen. The surgeon demands, and has the right to expect, the maximum relaxation obtainable without unduly increasing the hazards of the operation, while the patient demands, and likewise has the right to expect, the minimum of discomfort preceding and during the operation. Service with safety to the patient is the aim of both surgeon and anæsthetist, and this aim is not fulfilled when the surgeon has to obtain adequate exposure only by virtue of the strong arms of his assistants, nor is it fulfilled if the desired relaxation is obtained at the risk of greatly increased operative and post-operative complications. Surgery of the upper abdomen, while it constitutes a relatively small number of cases, less than 5 per cent of those performed in a large city hospital, does present the greatest difficulty from an anæsthetic standpoint. It is our contention that the technique to be described, namely, combined nupercain spinal and cyclopropane anæsthesia, is of particular value in this group of cases, and thus has a very definite place in the armamentarium of the trained anæsthetist.

To facilitate the surgical problems in the upper abdomen the ideal anæsthetic is the "perfect spinal". By a perfect spinal one implies a placid patient, free of mental or physical distress, and a relaxed abdomen with contracted intestines and quiet respirations, followed by an uncomplicated convalescence. This we can obtain in the majority of cases with spinal anæsthesia alone. It is the minority of cases that provide plenty of grief for surgeon and anæsthetist alike. Nor can the inadequate spinal be made adequate by the proverbial "whiff" of gas. When painful stimuli are evoked at any stage of an operation being performed under spinal anæsthesia it is essential that the anæsthetist proceed with the inhalation agent as though nothing had been used, and, further, it is essential that all manipulation in the abdomen cease until such time as full surgical anæsthesia is obtained.

Total spinal anæsthesia may be unsatisfactory for any one of a number of reasons.

1. In the nervous or apprehensive patient it is rarely possible to avoid psychic shock if the patient knows an operation is being performed, and many of these will insist on being put to sleep before the incision is made. The use of basal anæsthetics, such as rectal avertin or intravenous barbiturates, or of heavy sedatives, with the associated respiratory depression, has no place in surgery of the upper abdomen.

2. A carefully calculated and administered dosage of a known anæsthetic drug may fail to reach a segment of the spinal cord high enough to anæsthetize the whole of the operative area. Or, motor anæsthesia and relaxation may be adequate, without associated sensory anæsthesia. This latter is particularly apt to occur when a dilute drug such as nupercain in 1:1,500 solution is used.

3. Retching and vomiting, caused by a too high spinal, or by a gall-bladder rest, or by tight packs up against the diaphragm, or by traction on viscera, may be so persistent as to increase the surgeon's difficulties materially. This can be controlled adequately only by the addition of an inhalation anæsthetic.

4. Operations in the upper abdomen are frequently quite prolonged, so that the effect of the spinal anæsthesia wears off, causing distress to the patient as well as to the surgical team.

5. When oxygen administration is indicated during an operation performed under high spinal anæsthesia, with a conscious patient, the

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presence of the mask over the face gives rise to some discomfort and complaint from the patient unless a small amount of an anæsthetic agent is added. Rather than risk an inadequate spinal the tendency is to give the maximum dose, thereby increasing the danger of the anæsthetic.

The technique which I wish to present to you has been used for the past three or four years by all the members of the anæsthetic staff of the Toronto Western Hospital, and consists of the spinal injection of a minimum dose of nupercain, 1:1,500 solution, followed by the induction and maintenance of light cyclopropane anæsthesia, which is undertaken before the surgical preparation is commenced.

The usual premedication given has been nembutal, gr. 1½, on the night prior to operation, with morphine gr. ⅛ to ¼, and scopolamine gr. 1/300 to 1/150 one hour before operation. If the operation is slated for the latter part of the morning it may be of advantage to repeat the nembutal two hours before operation. The scopolamine used is in solution, in ampoules containing gr. 1/150, in which form it would seem to be more stable than in tablets. Our experience confirms this since we at the Western Hospital have used some 7,000 to 8,000 ampoules for this purpose without a single case of cerebral irritability such as occasionally followed the administration of scopolamine (or hyoscine) in tablet form.

The nupercain used is the 20 c.c. ampoule of 1:1,500 solution in 0.5 per cent saline, which has a specific gravity of 1.003, and is therefore hypobaric, or lighter than spinal fluid. With the patient in the anæsthetic room, in the lateral position, the skin over the lumbar spine is prepared with iodine and alcohol, and the space between the second and third lumbar vertebræ is infiltrated with 0.5 per cent novocain to which has been added ephedrin, gr. 1. A 20 c.c. Luer-Lock syringe is rinsed with 1 to 2 c.c. of nupercain, to be sure of getting rid of any alkali which might precipitate the nupercain, and then is loaded with the desired dose of the drug. Spinal puncture is done with a 22-gauge needle (rarely with a 20- or 21-gauge) and the injection is made without removal of spinal fluid and without barbotage. The patient is then turned on the face with a small pillow under the costal margin. After five minutes in this position the patient is turned on the back and induction of anæsthesia with cyclopropane carried out, the desired depth of anæsthesia being in the lower first plane. When the induction is complete the surgical preparation and operation are proceeded with.

The usual dosage of nupercain is from 8 to 12 c.c., the average in our series being 11.0 c.c., as opposed to an average of 14.6 c.c. in total spinal cases. The concentration of 10 to 20 per cent cyclopropane in oxygen ensures at all times against oxygen want.

Nupercain would seem to have very definite advantages over other spinal anæsthetic agents, in combination with cyclopropane. In our experience the anæsthesia resulting from it is much more consistent and more uniform; when anæsthesia is deficient the deficiency is invariably sensory rather than motor, which deficiency can readily be controlled by cyclopropane; the duration of motor anæsthesia produced by nupercain is more than double that obtained with procaine or allied drugs; because of the 1:1,500 solution being hypobaric the use of a kidney or gall bladder rest, or of the Trendelenburg position, increases the anæsthesia in the desired area; as evidenced by fall in blood pressure, nupercain is less toxic than other spinal agents.

It is my purpose to present a review of 226 upper abdominal operations with anæsthetics administered by, or under the direct supervision of, the staff in anæsthesia of the Toronto Western Hospital. The operations performed include gastric resections and anastomoses, cholecystectomies, and others as shown in Table I.

TABLE I.
226 UPPER ABDOMINAL OPERATIONS

Cholecystectomy	114
Gastrectomy and gastro-enterostomy	45
Bowel resection	42
Perforated ulcer	19
Splenectomy	5
Diaphragmatic hernia	1

For purposes of comparison those cases were not included where drugs other than nupercain were used for spinal injection.

In Table II these cases will be seen under the various anæsthetic techniques employed.

The major complications included atelectasis 6, pneumonia 5, pleurisy with bronchitis 1, pulmonary œdema 1, embolus of popliteal artery 1, hemiplegia. Peritonitis and wound infections have not been listed. As will be seen, ether was commonly used in shorter and simpler cases which were more suitable for the teaching of

anæsthesia to junior interns and students. No operative procedure in this series took longer than three hours. No deaths occurred on the table, and the deaths listed were confined to those which might be associated, directly or indirectly, with the anæsthesia. The causes of death included pneumonia, shock, massive collapse with peritonitis, and pulmonary emboli.

Since respiratory depression is always present from the combined effect of sedatives, anæsthesia, and the operation, some measures to prevent post-operative pulmonary complications should be employed. Before leaving the table we make a practice of replacing the oxygen and cyclopropane in the alveoli by hyperventilation with air from the gas machine. When the patient is returned to bed orders are left for postural changes every hour, and, where indicated, for the administration of carbon dioxide and oxygen every two to four hours.

A fairly large proportion of the surgical cases under discussion may be classified as doubtful or poor risk patients. It is in these groups that the combined technique is of particular value. The technique may be employed in any case where either spinal alone or any inhalation anæsthetic could be considered, the only exception being the patient *in extremis*, when a minimum of operating under local anæsthesia should be performed. Nor do we feel that the advantages of the combined technique should be denied to the good risk patient. While our discussion has been confined to the relatively small group of upper abdominal operations, which are the "problem children" of the anæsthetist, this technique has been widely used in other abdominal surgery, as in hysterectomies and appendicectomies, with equally gratifying results.

TABLE II.

Technique	*No. of cases*	*Average operative time hrs.*	*Average dose nupercain c.c.*	*Major complications percentage*	*Mortality percentage*
Ether	63	1.2		4.8	3.2
Spinal	41	1.4	14.6	7.3	4.8
Spinal (supplemented)	27	1.8	14.5	22.2	3.7
Combined	95	1.6	11.0	4.2	2.1

SUMMARY

1. A review has been made of the essentials in the administration of anæsthesia for surgery of the upper abdomen.

2. An outline of a technique in use at the Toronto Western Hospital has been given.

3. A review of 226 upper abdominal operations under ether, spinal alone, supplemented spinal, and combined nupercain, spinal and cyclopropane anæsthesia has been presented.

4. By employing a combination of nupercain spinal anæsthesia in minimum dosage with light cyclopropane inhalation anæsthesia certain of the disadvantages of other types of anæsthesia are avoided. Psychic and spinal shock are greatly reduced, and adequate relaxation for upper abdominal surgery is obtained in a high percentage of cases.

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RÉSUMÉ

Dans les opérations pratiquées au niveau du tiers supérieur de l'abdomen, l'anesthésie réalisée par la rachi nupercainique supplémentée par le cyclopropane nous paraît la meilleure, parce que la rachi seule peut ne pas toujours être suffisante pour plusieurs raisons. Voici les principales: un malade trop nerveux; la possibilité de ne pas analgésier les métamères trop élevés; les vomissements et les nausées; l'épuisement de l'effet analgésique. La méthode que nous utilisons depuis 4 ans paraît bonne. Elle consiste à injecter une dose minima de nupercaine et de compléter par un volume également très réduit de cyclopropane. 1½ gr. de Nembutal est donné la veille, et, avant l'opération, une injection de morphine (⅛ à ¼ de gr.) et scopolamine (1/300 à 1/150 de gr.). La nupercaine employée est l'ampoule de 20 c.c. de la solution à 1:1,500 en solution dans du sérum physiologique à 0.5 pour cent. En moyenne 11 c.c. suffisent. La concentration de cyclopropane varie entre 10 et 20 pour cent. Le malade est invité à respirer pendant quelques minutes de l'oxygène pur avant de quitter la salle d'opération. La seule contre-indication paraît être le cas de malades *in extremis* où la rachi seule est préférable.

JEAN SAUCIER

DE L'EVOLUTION GÉNÉRALE DE LA SYPHILIS ACQUISE

PAR ALBÉRIC MARIN, M.D., F.R.C.P.(C.)

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L'ÉVOLUTION générale de la syphilis, bien que souvent d'allure capricieuse, obéit néanmoins à certaines lois. Tout au début de l'infection ces lois sont même assez précises. Plus tard, selon les sujets et diverses circonstances, il y aura des variations dans l'évolution, la localisation, l'intensité, le pronostic et la réponse au traitement. Mais quelque soit le mode contamination, vénérien ou accidentel, quelque soit la localisation du point d'inoculation (génital ou extra-génital), la syphilis, du moins lors de ses premières étapes, adopte un rythme à peu près uniforme chez la plupart des sujets. Nous omettons certains cas spéciaux comme la syphilis récemment acquise chez la femme qui devient enceinte et d'autres éventualités (inoculation profonde, transfusion, etc.).

Contrairement à ce que l'on pensait autrefois, la généralisation de l'infection se fait presque immédiatement. Il y a quelques années encore, on croyait que la syphilis était devenue une maladie générale seulement à la période secondaire, lors de l'apparition des signes de dissémination que l'on aperçoit sur tout le revêtement cutanéo-muqueux. De nos jours, l'on sait par des expériences de médecine expérimentale que la généralisation des tréponèmes à tout l'organisme s'accomplit dans les quelques heures qui suivent la contamination.

Nous ne citerons que l'expérience de deux chercheurs américains, Brown et Pierce. Ceux-ci par injection intra-testiculaire syphilisent deux lapins. Le lapin No I est castré 48 heures après l'inoculation. Le lapin No II est gardé comme témoin. Si les tréponèmes sont restés cantonnés dans le testicule inoculé, le lapin No I qui a subi la castration ne présentera pas de signes de syphilis généralisée. Seul le lapin No II en offrira. Or dans les semaines qui suivent les deux lapins, le castré et l'intact, présentent tous deux à la même époquer les mêmes signes de généralisation. De nombreuses observations recueillies en médecine humaine (comme l'excision précoce du chancre) ont donné des résultats superposables.

La généralisation de l'infection se fait donc presque immédiatement après l'inoculation: un groupe de tréponèmes pullule sur place, un second prend la voie sanguine et un troisième la voie lymphatique. Le contact infectant est suivi d'une période de silence apparent, dite d'incubation, qui dure environ trois semaines. Rien encore indique extérieurement qu'il y ait eu contamination.

Puis au point d'inoculation apparaît la première manifestation clinique de la syphilis: c'est l'accident primitif, le chancre syphilitique. Au bout de huit, dix jours, se montre dans le territoire ganglionnaire voisin du chancre, l'adénopathie satellite. Le chancre laissé à lui-même évoluera durant deux mois environ, puis disparaîtra. Jusque vers sa fin, sa surface fourmille de tréponèmes. A peu près trois semaines après l'apparition du chancre, soit six semaines après l'inoculation, le sang qui était infecté depuis les premières heures mais qui n'en donnait aucune manifestation, offre des signes de laboratoire positifs de l'infection tréponémique. Ainsi les réactions de Wassermann, de Kahn, de Hinton, Bertrand et autres, qui étaient négatives deviennent positives vers la sixième semaine. C'est la brève période primaire sérologique qui commence. Avant l'apparition des réactions sanguines positives, il s'agissait de syphilis primaire pré-sérologique. Ces deux étapes de la syphilis primaire, pré-sérologique et sérologique, doivent retenir l'attention. Cette distinction est d'une grande importance pratique. En effet les malades traités dès la phase pré-sérologique guérissent plus sûrement et plus rapidement que les autres.

Environ trois semaines après l'apparition de ces réaction sanguines positives, soit neuf semaines après le début de l'infection, se termine la période primaire par l'explosion des accidents secondaires. Cette période secondaire éclate par l'apparition de lésions cutanées et muqueuses, de forme et d'aspect divers, abondantes, souvent généralisées à presque tout le tégument. En même temps que ces manifestations cutanéo-muqueuses apparaissent des signes indiquant une atteinte de l'état général: faiblesse, anémie, inappétence, insomnie, céphalée vespérale, etc.

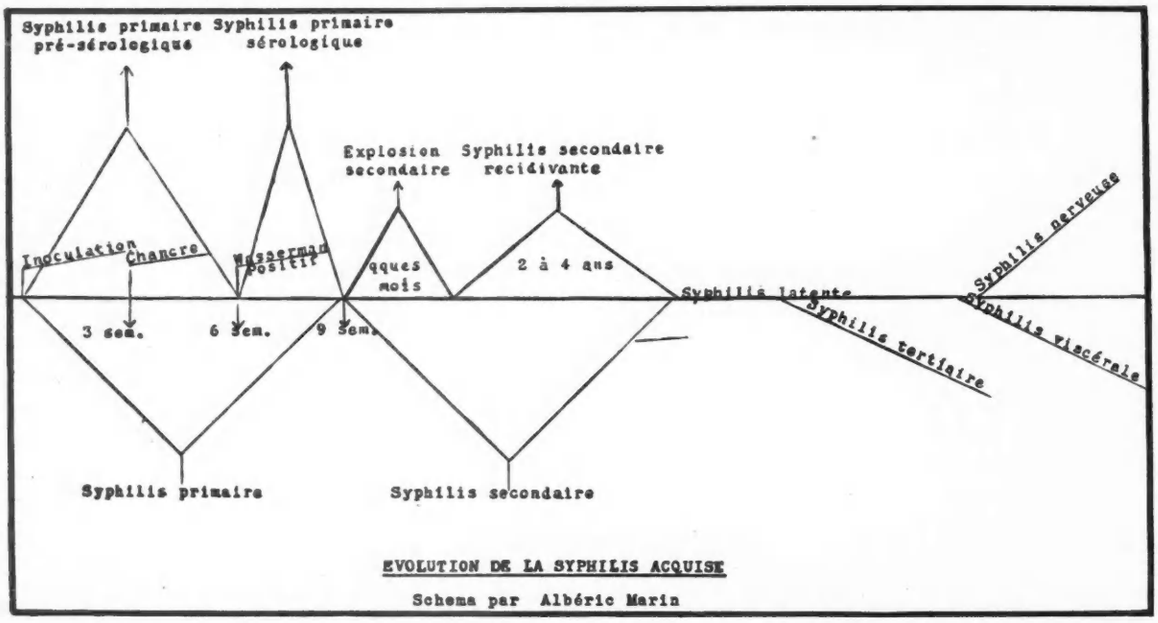
Sans traitement ces accidents disparaîtront d'eux-mêmes en deux, trois mois, mais durant les deux, trois parfois quatre années qui suivent, il y aura le plus habituellement chez le syphilitique non traité ou insuffisamment traité, de

multiple récidives soit à la peau, soit aux muqueuses. Elles surviendront à des intervalles irréguliers, avec une intensité inégale. Les lésions muqueuses sont parfois très discrètes, peuvent passer inaperçues, surtout chez la femme mais sont éminemment contagieuses. En réalité, c'est par l'intermédiaire de ces petites érosions muqueuses, d'allure insignifiante que s'opère le plus grand nombre de contaminations. C'est la syphilis secondaire récidivante. A partir de la quatrième année, parfois avant, la maladie entre dans une phase de latence.

Dès ce moment diverses éventualités surviennent. La syphilis latente peut durer toute la vie, sans donner d'autres signes que des réactions sérologiques positives. Il s'agit alors de syphilis bénigne qui permet à l'individu de vivre jusqu'à un âge assez avancé. Mais le plus souvent, après une période de syphilis latente indéterminée, des échéances graves plus ou moins éloignées surviennent. Au bout de cinq, dix, vingt ans et plus, peuvent se montrer des accidents tertiaires à la peau ou aux muqueuses. Ils évoluent durant des mois, des années, disparaissent et reviennent. Profonds et mutilants, ils réalisent des dégâts parfois très étendus, des infirmités irréparables.

Indépendamment de ces accidents tertiaires cutanéo-muqueux, et qu'ils se produisent ou non, il est possible que la syphilis tardive accomplisse une œuvre sournoise et plus grave. Elle attaque certains viscères importants, notamment l'appareil cardio-vasculaire; des affections cardiaques souvent mortelles s'installent avec une grande fréquence. Cette syphilis viscérale constitue un chapitre important de la pathologie humaine. Celle-ci s'installe insidieusement, ne donnant au début que des malaises vagues. Ce n'est souvent qu'au bout de dix, vingt ans, que des signes caractéristiques d'atteinte viscérale (cardiaque, aortite, etc.) s'installent.

Ou bien encore, la syphilis s'insinuera du côté du système nerveux central et complication redoutable, causera les désastres que l'on connaît: la syphilis cérébrale, la paralysie générale, le tabès, la tabo-parésie, la syphilis méningo-vasculaire. En réalité si les signes cliniques de syphilis nerveuse font une apparition tardive, (dix, vingt ans après le chancre) les signes sérologiques (liquide céphalo-rachidien positif) sont décélables par la ponction lombaire le plus habituellement vers la quatrième année. Cette syphilis nerveuse s'associe parfois à de la syphilis cardiaque.



EVOLUTION DE LA SYPHILIS ACQUISE

Schema par Albéric Marin

En effet, la periode pré-clinique ou purement sérologique de la syphilis nerveuse dure cinq, dix ans, parfois davantage. Cette syphilis nerveuse asymptomatique sera suivie de signes cliniques évidents. Elle se manifestera par l'un des grands syndrômes énumérées plus haut.

Voilà, dessinées à grands traits, quelques notions concernant la pathologie générale et l'évolution de l'infection tréponémique.

Afin de les résumer dans un raccourci visuel, nous avons imaginé le schéma ci-dessus.

Nous avons cru utile de le publier, parce qu'il nous semble assez bien illustrer par un diagramme en quelque sorte mnémotechnique, la marche générale de cette maladie avec ses tangentes variées.

A TEST FOR ACTIVITY IN PULMONARY TUBERCULOSIS*

(A STUDY OF TWO HUNDRED CASES)

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DR. MEDLAR describes the leucocytic picture as our nearest approach to the tuberculous lesion in the living body. Recent knowledge of the value of the leucocytic blood picture comes to us mainly from such workers as Arneth,[1] Schilling,[1] Cunningham,[2] Sabin,[3] Medlar,[4] Wiseman,[5] and others, the former in the demonstration of the status of the lesion, and the latter emphasizing the monocyte-lymphocyte ratio and its clinical significance.

From the work done by the above-mentioned we know: (1) That with active tuberculous lesions there is an increase in the young forms of the neutrophiles and in the monocytes, a decrease in the large and small lymphocytes, and the eosinophiles disappear. In many of these studies it has been found that the clinical and blood pictures generally agree. (2) In cases showing clinical improvement or arrest the total number of leucocytes is down, the monocytes which are associated with new tubercle formation, and the neutrophiles, especially the younger forms, are decreased, and lymphocytes predominate in the healing picture.

At first, we used the Arneth and then the Schilling method of count, and with the data, using the neutrophiles, monocytes and lymphocytes, we made a working ratio M+N/L, and used this with tuberculin to test moderately active cases, using as a control x-ray films, physical signs, and the red cell sedimentation rate. In our pneumothorax cases it was found that the M + N/L ratio, which we acIled the L.A.R. (leucocytic activity ratio) ran a curve parallel to that of the sedimentation rate. Medlar reports such sedimentation rate control of pneumothorax cases.

In order to produce a minimal amount of controlled tuberculous reaction to stimulate the leucocytic shift, we used, in conjunction with the L.A.R., old tuberculin, a gift from Dr. Baldwin, of Trudeau Sanatorium, using 0.05 c.c. of a 1:1,000 fresh solution. It was given by the Mantoux method, the bleb being twice as large as in the usual Mantoux test. A 1:10,000 solution is used for children.

We made blood counts every four hours in tuberculous and non-tuberculous cases, and found the greatest leucocytic reaction 24 hours after the tuberculin injection.

For a standard control we tested thirty apparently healthy nurses, and found all who had been in training over one year showing a slightly positive reaction and an inactive drop to a point below 2 after the second M + N/L reading, twenty-four hours after the Mantoux injection.

Of four negatively (tuberculin) reacting nurses, probationers from last year, three had become tuberculous, and one had become slightly positive, with a negative x-ray film.

Many of the former negative skin reactors showed calcified peribronchial glands and a hilum type of tuberculosis.

Regarding negative reactors to the regular Mantoux test, we heartily agree with Medlar[7] that "All negative reactors should be carefully watched." This is especially true of nurses in our sanatoria. Geer[8] had 11 nurses, with 2 out of 6 negative reactors, developing tuberculosis. Heimbeck[9] had 69 out of 226 nurses, or 30.5 per cent, coming down with the infection while in training. He also noted that out of 109 cases 51 were negative, 13 of whom later developed active tuberculosis. There were 58 positive reactors, none of whom developed the disease. Here we are dealing with adult nurses in hospital and not with a child's reaction to tuberculin. Boynton[10] reported 18 per cent of negative reactors becoming infected. In Korea, where as yet there is much less immunity against tuberculosis than we see in Europe and the United States of America, and where the mortality rate is exceptionally high, we find that like Paretzky[11] "It behooves us to watch all negative reactors as potentially of low im-

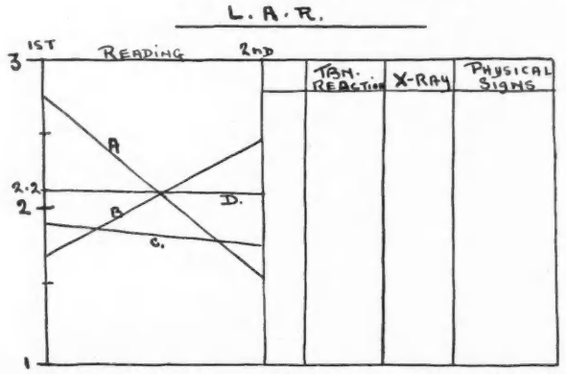
* Read before the Medical Missionary Association of Korea.

munity, and thus susceptible to disease." In a study of many cases in Korea we find the majority of our normals not reading negative as in America and Canada, but reading a slight positive O.T. (Mantoux reaction) using 1:10,000 or 1:1,000 dilution, suggesting the presence of infection but not necessarily activity of the disease.

A study was made of an adolescent and adult group of 170 doubtful, minimal, and advanced cases, using the above technique, that is, at 10.00 a.m., after the first blood had been taken and counted (200 cells in all cases were counted by the same technician) a modified Mantoux test was given, and 24 hours later, a second blood count was obtained, and a graph of the two results plotted. All of the inactive cases, except the arrested ones, had an initial reading above 2.2, and all the active cases below 2.2. The results of the tests were as follows: (1) Most of the negative skin reactors to this modified Mantoux gave a low resistance or immunity reading, all being about 1.6 with an active rise, and x-ray and physical findings were positive for tuberculosis. (2) Clinically arrested cases, and those with a history of pleurisy with effusion, without apparent parenchymatous involvement, showed a reading below the 2.2 level, and a moderately inactive drop, almost parallel to the horizontal, suggesting the possibility of relapse. (3) Active cases, especially those with laryngeal or other complications, showed a low first count like the negative reactors, and a sharp rise above the horizontal, the rise being in proportion to the amount of activity shown by x-ray and physical findings. (4) An important fact was noted in cases of pneumothorax collapse controlled by sedimentation rate readings.

At first, the L.A.R. and S.R. curves rose together, and then dropped as the collapse was completed and physical signs improved. The L.A.R. with Mantoux tests were given weekly, and in cases in which pneumothorax had to be abandoned because of adhesions or fluid, the L.A.R. showed an active rise again, showing that the test is of value in demonstrating activity or inactivity at the time of the test. (5) The test was also of value in advising pregnant women with histories of pleurisy or arrested tuberculous lesions as to whether they should go on to full term. A test was made monthly, and from the first three months of pregnancy, and readings noted. (6) The test is also useful in cases of differential diagnosis, especially where there is doubt between early hæmoptysic heart cases, and other chest conditions, such as the hæmoptysis of lung distoma, of which we have a great number of cases in Korea. (7) One case, of a woman of thirty, picked as a normal with symptoms only of neurasthenia and no clinical signs of tuberculosis, after testing showed marked activity; a week later her sedimentation rate was 49, and two weeks later, the first x-ray signs were seen in the parenchyma of the lung. (8) In the 200 cases studied, the results of the test agree entirely with the physical, x-ray and laboratory examinations. These were

A.	Inactive cases	46
B.	Active cases	122
C.	Arrested cases	32
	Total	200



Graphs of typical readings taken from the 200 cases studied. A.—Inactive drop. B.—Active rise. C.—Arrested cases. D.—Normal ratio.

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Case Reports

ALLERGIC REACTION TO STILBŒSTROL

BY K. A. BAIRD

Saint John, N.B.

The following case is reported as evidence that some patients may be allergic to synthetic œstrogenic preparations.

Mrs. J.L., aged 48, visited her doctor complaining of menopausal symptoms, (hot flashes, dizzy spells, etc.). She was given a prescription for stilbœstrol tablets. Her symptoms were definitely relieved in a very few days, but four days after beginning to take the tablets, she developed a rash over the arms, legs, and some parts of the body. This was itchy and irritating and when admitted to hospital next day, some areas were "weeping" and infected.

The tablets were discontinued, calamine lotion was applied to the rash, and moist boracic dressings to the area for three days. When some menopausal symptoms returned they were relieved by an intramuscular injection of one of the ordinary commercial preparations of naturally-occurring œstrogen in oil. She was discharged ten days after admission with her skin condition practically cured.

A CASE OF PRIMARY AMENORRHŒA

BY R. V. CHAPPLE, B.A., M.D.

Sudbury

Miss L., aged 16, came to us accompanied by her mother first on November 7, 1938. The mother stated that as yet her daughter had not menstruated while secondary sex characteristics had appeared two years previously.

Previous history.—The patient had a normal birth with no history of cerebral injury. Growth during childhood was equal to that of her brothers and sisters. Her academic record had been exceptionally good. She had always been cheerful, with no depressive states. Childhood diseases consisted of measles, scarlatina, and occasional colds.

Family history.—Irrelevant.

Physical examination.—Height 5 feet 1 inch; weight 93 pounds.

Physical examination revealed no abnormalities. The thyroid was just palpable. Breasts were very small, though rounded. Pubic and axillary hair was present. The vulva appeared very infantile. Rectal examination was performed but results were very unsatisfactory, due to apprehension of the patient. Urine negative.

On November 11, 1938, under gas anæsthesia the vaginal tract was explored. The external genitalia were all present and normal in structure but rather infantile. The introitus was intact. A small vertical septum was present in the vagina about one inch from the introitus, extending to about two inches from it. This was ruptured by the examining hand. The cervix was very small, about three-quarters of an inch long and one-half inches in diameter. The os was extremely small, admitting a small probe which passed about one and one-half inches. The uterus and ovaries were not palpable bimanually. The adnexa presented no masses. The diagnosis was primary amenorrhœa due to hypoplastic or infantile uterus and ovaries.

With the presence of secondary characteristics as mentioned one assumes that the sex factor in this patient is essentially female. The absence of menstrual flow is possibly due to either (1) absent or hypoplastic ovarian tissue; or (2) an infantile uterus, or a combination of both.

Sifting out the maze of literature on endocrinological topics one is impressed by the diversity of general opinion. However, it was felt in a case like this that some substance must be supplied which will create a follicle stimulation and then a luteinization phase, thereby setting up the normal ovary-uterus cycle. In this we are assuming that there is sufficient ovarian tissue present to stimulate, irrespective of the fact that the ovaries are not palpable. We know there is a small amount of uterine tissue present. A precursor to this treatment would be some œstrogenic substance with a view to stepping up the endocrinological system before specific treatment was given. (The Professional Service Department of Ayerst, McKenna & Harrison, Montreal, was consulted in respect to possible substances available).

It was decided to use emmenin, gonadotropic factor and A.P.L. in an effort to set up the desired cycle. The so-called "priming period" with emmenin began December 9, 1938, and ended January 30, 1939, the dosage being one teaspoonful of the liquid three times daily. Specific treatment followed with the injection of 1 c.c. A.P.L. and 1 c.c. gonadotropic hormone triweekly. Injections were made simultaneously, beginning January 30, 1939. This treatment was carried on until August 8, 1939. The first symptom of a menstrual cycle occurred on April 5th, when the patient complained of lower backache, malaise, and a watery discharge. These cleared up completely by April 12th. Examination at this time found the breasts larger than previously, firm, with no tenderness. The vulva was considerably increased in size, cervix soft, without any definite enlargement; the uterus was not palpable.

The second unit of a menstrual cycle occurred from May 16 to May 22, 1939, when the patient had a definite menstrual period. The injection of hormones was continued. The next period or pseudo-period occurred from June 25th to June 29th, followed by a normal period between July 8th and 16th. Treatment was maintained and a further period occurred between August 8th and 12th. It was felt at this time that a proving time should be allowed to see if the patient would continue her cycle. No further injections were given after August 8th.

The patient had no further periods and reported again on November 11, 1939. At this time she stated that she did not want to take further injection if any other method of treatment was available. A synthetic œstrogen, stilbœstrol, was considered as a possible means of producing further uterine growth and secondary sex development. Estrobene (Ayerst, McKenna & Harrison) 0.5 mg. capsules, was used in the following manner. Three tablets daily for three weeks, then

a free interval of one week. This routine was to be repeated for three months. However a menstrual period occurred from January 5th to 11th. Treatment was stopped during this period and continued at its cessation until January 31st when a further period occurred. Examination at this time revealed the breasts much larger, firm, well rounded. The cervix appeared larger and somewhat soft. The uterus and adnexa were not palpable. The patient appears much brighter and more interested in life. The patient has not had further treatment, *i.e.*, since January 31, 1940, and to date is having regular normal periods.

COMMENT

1. A case of primary amenorrhœa is presented with a satisfactory outcome.

2. The fact that the patient had no periods when treatment was stopped and then began again after treatment was re-instated strongly suggests the value of this treatment.

3. The increased size of the genitalia, and breasts, together with the changed outlook of this patient, is further evidence of the value of the treatment.

4. The full co-operation of the patient must be elicited, as injections tri-weekly over a period of months is something one should not think lightly of.

We wish to thank the Professional Service Department of Ayerst, McKenna & Harrison for their valuable literature and advice; also for the hormones emmenin, A.P.L., and gonadotropic substance which they supplied for our use gratis.

Editorial

LINES OF DEFENCE . . . AND OF OFFENCE

AT this present, even more than in the so-called Great War, the resources of our Empire are being mobilized to the limit. Not only are soldiers, sailors, aviators, professionals, and amateurs called upon for service, but the whole population, men, women and children, finds itself confronted with tasks of vital importance. This War is everybody's war. The response from all classes of our people has been spontaneous, quick, and whole-hearted. This is, of course, highly gratifying, but it is not enough. We must see to it that each of us is assigned to the duties that he is best qualified to perform. Those who do not come up to standard must be trained if that be possible or transferred to a more suitable job. A basal requirement is that the health of all be promoted to the limit. If it is not, we are doing less than our best.

We not infrequently speak of our combatant forces as "the first line of defence". It is doubtful if we are justified in so doing. Indeed, as His Majesty has said:—"We are all in the front line." While our fighters are of inestimable value it is obvious that they would be less effective, indeed, they would be betrayed, were they not supplied with reliable guns and ammunition, ships, planes, tanks, food, and a sufficient reservoir from which to draw their supplies and reinforcements. As important, therefore, is our army of industrial workers. Then come the rest of us, with varied, perhaps lesser, talents and different opportunities. Should we speak, then, of a second or a third line of defence? We think not. The "lines of defence" are numerous; they merge and converge, looking towards the final goal—victory. Some of them, too, if important in wartime, are as important in peacetime if we are to build up a healthy, strong, brave, and resourceful people.

In all of these spheres the rôle of the doctor bulks large. He is by no means the least factor in the coordination of the common effort; his duties carry him far and wide. All this sounds commonplace; we assent to it at once. Do we properly apply the knowledge we undoubtedly possess? Do we fully grasp all the implications? In some particulars we might do better. No doubt the will is there, but the performance is sometimes weak.

Major-General LaFlèche calls attention to one situation that calls for remedy. He finds that many recruits are categorized in certain classes at their first medical examination, but when they come to their second examination, this time at the hands of other medical men who belong to the Army Medical Corps, they do not stand up so well. Probably this is due in the first instance to lack of experience and inattention to detail, but now that every medical practitioner in Canada is a potential Medical Examiner for military service the matter assumes even greater importance.

The practice of x-raying the chests of prospective recruits is an excellently good

one. It will block the enlistment of many undesirable men, will prevent much illness on active service, and will save the country millions in the cost of treatment and subsequent pension, particularly in the case of tuberculosis. Dr. Andrus, also, in a valuable article in this issue, calls attention to the importance of "deep chest" in evaluating the "enlistability" of prospective recruits. We would suggest that testing for syphilis is of as great importance.

Aviation Medicine has by now attained almost the dignity of a specialty. Not only does the examination of the applicant in the first instance demand wide knowledge and experience on the part of the medical examiner, but high speeds and high altitudes have confronted us with new problems which urgently demand investigation. The *Journal* hopes to devote more attention to this subject in the near future.

Then, we come to our operatives, of whom the classes are endless. Their selection for fitness and their maintenance in vigour is of fundamental importance. Work rooms and factories should be roomy, well lighted, and well ventilated. The health of our manual workers should be promoted by medical examination before they enter on their special tasks and by periodic tests in the case of those who are engaged in hazardous occupations, such, for example, as the manufacture and handling of explosives. Inefficiency due to fatigue, ill health, means diminished output, mistakes in delicate operations, accidents, and diminution in "pep".

In Great Britain the Health of Munition Workers Committee, years ago (1915), found that a seven-day working week had bad effects. The statistical evidence collected for the Committee showed that men engaged in fairly heavy work attained their best production on a fifty-five-hour week.

"A medical examination of 1,540 men (aged 41 or more) drawn from a number of munition factories showed that 17 per cent were 'slightly below normal', while 5 per cent were 'much below normal' and 0.4 per cent were in 'bad' condition. The 1,500 boys examined (at ages of 14 to 17) were healthier than the men, in spite of the fact that most of them were working for sixty to seventy hours a week. This was probably because of the shorter periods for which they had been engaged on munition work and the lighter character of their occupations."[1]

The diminished output due to strikes, lockouts, and "sit-downs", mentioned in other countries, does not worry us of "The Empire", thank God. Our operatives have met the emergency nobly, and, too, are in "the front line."

All of which is well known to us, accepted in principle, but not yet fully put into practice. It is mentioned once again, "lest we forget." We are glad to add, however, that our Association is concerning itself with Industrial Medicine under war demands, and a draft syllabus has already been drawn up.

A.G.N.

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Editorial Comment

Rats in the West

Plague surveys in Western Canada are reported in a recent issue of the *Canadian Public Health Journal* by Gibbons and Humphreys.* They say, "Sylvatic plague was first demonstrated on the North American continent in 1909 infecting ground squirrels in the state of California. Subsequent extensive field investigations have discovered wild rodent plague in ten of the western states, including Washington, Idaho and Montana, which border on the provinces of Alberta and British Columbia. Twenty-nine species of rodents have been incriminated, of which fourteen species of ground squirrels form the most important reservoir of infection.

"Following a general survey in 1938, particular attention was given to the southern portion of each province in view of the known sylvatic plague foci in the border states.

"No evidence of plague was found in 3,949 rodents and 10,066 fleas collected in British Columbia, nor has any history been obtained of suggestive rodent epizootics.

"In August, 1939, *Pasteurella pestis* was demonstrated in tissue from a Richardson's ground squirrel found dead in eastern Alberta, 180 miles north of the international boundary. Five out of 80 flea pools and one out of 60

* Gibbons, R. J. and Humphreys, F. A.: Plague surveys in Western Canada, *Canad. Pub. Health J.*, 1941, 32: 24.

tissue samples have been positive for plague. These new findings place the infection over an area of at least 144 square miles extending into four townships.

"Before the discovery of sylvatic plague in this area a local farmer had died under conditions which in retrospect are suspicious of plague infection.

"Though no definitely proved cases of human plague have occurred, the demonstration of infection in wild rodents is a matter of concern because of the potential hazards involved. A single unrecognized human case, should it become pneumonic, could readily initiate a sharp and highly fatal epidemic. This was illustrated in the Oakland outbreak of 1919 and the Los Angeles epidemic in 1925. Further, should infected ground squirrels come in contact with rats in an urban area, the disease might, if conditions were suitable, become epidemic in the classical form.

"At present we do not know how the infection in wild rodents was introduced into Western Canada or to what extent it has or will in the future spread. Since wild rodent plague may remain apparently quiescent in any one area for several years and then reappear, negative findings in any one season do not preclude the presence of plague infection. Extensive and continued examinations of the wild rodent population are therefore necessary if the infection is to be controlled."

The brown (or Norwegian) rat was first reported in Saskatchewan in 1912, when rats were observed in the village of Gainsborough just west of the Manitoba boundary in the extreme southeast corner of the province. Rats have for many years been prevalent in Manitoba and the more eastern provinces and the migration is undoubtedly in a westerly direction.

Rats are travelling west over the prairies at the rate of about 30 miles a year. At present they are about half way between Moose Jaw and Swift Current. When they meet the plague-infected squirrels in Alberta the situation may be serious.

Dr. George Walton, medical health officer of Regina, says, "Sylvatic plague amongst Saskatchewan wild rodents has not yet been reported, but no surveys have been conducted. The danger is not immediate but it is a possibility and not a remote one". LILLIAN A. CHASE

Retrospect

NON-TUBERCULOUS THORACIC EMPYEMA. COLLECTIVE REVIEW OF LITERATURE FROM 1934 TO 1939*

ABSTRACTED BY FRANK DORRANCE

Montreal

The historical basis dates from the time of Hippocrates, who advised open drainage. The Empyema Commission, about 1920, established a modern concept of this condition and the treatment has been followed more or less generally to the present time. It is appreciated, however, in the case of the individual patient that this statistical study does not give all that can be known or done to ensure a functionally satisfactory lung. Reiteration at present in view of the mild influenza epidemic and the collection of large numbers of men in camps is deemed advisable. Few surgeons have the opportunity to treat more than a few cases during each winter season. The non-tuberculous is as much an entity as the tuberculous type, particularly in regard to treatment.

In Washington, with a population of one-half million, 317 cases were treated in their hospitals in 5 years; in Gothenburg Children's Hospital there were 159 cases in 15,302 admissions. Empyema is practically always secondary to pneumonia or influenza, the percentage varying from 80 to 60 following pneumonia, although the inverse ratio might occur as in the 1918 influenza epidemic. Following pneumonia in children empyema occurs in 6 to 12 per cent. Other causative organisms have been found, namely, streptococcus, staphylococcus, combinations of the above-mentioned, actinomycosis, fundiliform b., *B. typhosus, B. coli, B. megatherium, Br. abortus,* and *Ascaris lumbricoides.* The finding of the infecting agent is essential to a proper treatment; negative smears or cultures are strongly suggestive of tuberculosis or cancer.

Synpneumonic empyema is usually streptococcic and requires different treatment from the pneumococcus type which follows upon pneumonia. In this regard "unresolved pneumonia" is more often empyema. The diagnosis is suggested by a septic type of temperature; the physical signs are not pathognomonic. X-rays taken in frontal, lateral and frequently oblique planes and the use of the aspirating needle are the most informative procedures. Repeated x-rays are of distinct value in watching the progress of interlobar collections of pus; these should not be allowed to rupture into a bronchus. Exact definition of the limits of fluid by x-rays should be made before operative intervention. In encysted empyema the roentgenograms will definitely localize the site, size, and shape of the fluid.

Aspiration is the only definite means of diagnosis when pus is found. It enables us to dis-

* Ehler, A. A.: *Surg., Gyn. & Obst.*, 1941, **72**: (Inter. abstract, p. 17).

tinguish between a thick pleura, pulmonary infiltration or fibrosis, solid tumours, and atelectasis and is of distinct value in children with lobar or lobular pneumonia in whom there is frequently fluid in the pleural cavity. In rare cases the pus withdrawn may come from infected pulmonary cysts or tumours, or may be obtained by the incidental transpleural aspiration of a subphrenic abscess. A small amount of fluid is often present in the costo-diaphragmatic sulcus in pneumonia. This is particularly true in children in whom the fluid progresses from being yellow or slightly cloudy, containing a number of endothelial cells, to cloudy with endothelial cells and leucocytes, usually lymphocytes, to cloudy containing polymorphonuclear cells, and thence to cloudy with polymorphonuclear cells and pathogenic micro-organisms, or it may be arrested prior to the final state. Olesen and Hansen have used a supravital staining method to distinguish whether the leucocytes are living or dead, in which latter instance pus is usually found at a later date. Aspiration has been used by Harrington immediately prior to operation to outline the tract so as to ensure proper drainage. This method is not without danger to the patient.

The pus should be examined and the infecting organism isolated and recognized before operation. Alexander and Kinsella insist on immediate smear, culture, and injection into the guinea-pig in order to rule out tuberculous infection with superimposed pus-producing infection.

The physical characteristics of the pus are of distinct value in determining the time for operation. White insists that not more than 10 per cent of supernatant fluid be present after the pus has stood for 12 hours; Fitzgerald would have a positive manometric pressure in the pus; Pearse would wait until the specific gravity becomes constant, which is usually about 21 days after infection; Susman wishes a fixed intrapleural pressure and believes it indicates a localization of pus and fixation of the mediastinal structures; Berman uses the fluoroscope to show little or no change in the width of the mediastinal shadow with the two phases of respiration, and thinks this occurs at 7 to 10 days, at which time the pus is still thin; Graham would await thick, creamy pus, whilst Mason thinks that approximately 18 days in children is the proper time to intervene. All wish localization of pus, fixation of the mediastinum, and seek to avoid an open pneumothorax in the early stages of the disease.

Toxæmia and exhaustion are largely responsible for the mortality with empyema. Perforation of the chest wall, into a bronchus, the trachea, the œsophagus, the pericardium, the mediastinum, through the diaphragm (intra- or extra-peritoneally), to the perinephric space, into a blood vessel or into the spinal canal may occur. Spontaneous resorption of empyema occurs rarely, if ever. Healing of the cavity occurs as a result of the progressive formation of fibrous adhesions between the visceral and parietal pleura. Whether this be by centripetal progression or not has not been settled.

The criteria upon which any method of treatment must be judged are, primarily, that such treatment will save the life of the individual. Other, but still important, results to be obtained are complete evacuation of the pus, rapid elimination of toxicity and systemic effects, sterilization and subsequent complete closure of the cavity, complete healing of the external wound, restoration of the normal respiratory function of the lung, restoration of the patient to his normal economic and social status, the avoidance of chronic empyema and recurrence, and, finally, but not least, all these results in as short a time as possible.

Many methods of treatment are available, which roughly may be grouped into four classes: (1) drugs of various sorts; (2) aspiration of the pus with or without the introduction into the cavity of air or chemical solutions; (3) closed drainage, in which an effort is made to prevent the ingress of air; (4) open drainage in which negative intrathoracic pressure is not so thoroughly guarded against.

There are a few favourable reports on the treatment of streptococcic empyema with prontosil or sulfanilamide derivates both by mouth and as an injection into the cavity, but they are of small series. On the whole the results are not to be considered as offering a solution as specific treatment for even streptococcic empyema, inasmuch as it does not ensure even a reasonable removal of the pathological state.

Aspiration is a valuable diagnostic and therapeutic procedure up to a certain point. Its proper evaluation as a therapeutic measure should be judged by mortality, duration of toxicity, the number of failures, and the duration of convalescence. When so judged it falls much below other accepted methods. The injection of air following aspiration has several distinctly unfavourable effects, such as increase of respiratory embarrassment, probably an increased absorption of toxins, retardation of the formation of adhesions, and masking of the development of broncho-pleural fistula. The injection of optochin or iodized oil has had some favourable results; the latter has gained prominence as a means of outlining the extent of cavities pre-operatively.

Closed drainage does not allow for the operative removal of fibrinous masses, the recognition of bronchopleural fistula, the recognition and exploration of accessory pockets of pus, or assurance of dependent drainage. It greatly depends for its efficiency upon the suction and chemical solutions used in any of the many types of this procedure. A comparison of end-results from Wallace's, White and Collins, Utter, Mihara, Burpee, and Hochberg in a fairly large series of cases in each instance all show a much lower mortality by rib-resection than

by closed drainage. There is not much difference in post-operative hospitalization between the two methods. A score of reports in the literature, when grouped, show a mortality rate of about 15 per cent in any large series, although some have as low as 6.5 per cent under open drainage. The inference is that low mortality is considerably dependent upon local conditions.

The open drainage method is well standardized as to technique. Two new operations, Connors' and Weinberg's, are dependent upon the pre-operative formation of pleural adhesions. Weinberg's is roughly the formation of a moderate-sized pleural opening with tampon made with rubber tissue packed with gauze, which allows egress of pus but no ingress of air—53 patients with no deaths. Connors' is much the same technique but packing with gauze rather than "curtain drainage".

Koster insists that prolonged morbidity is due to lack of lung re-expansion. The use of "blow bottles" is deprecated; McMahon's inspiratory exercises seem to find more favour. Suction constantly performed is of distinct help, whilst the Drinker respirator has had good results in several old cases.

Infections of the chest wall are due to too strenuous efforts to prevent ingress of air about the tube, particularly in peritubal suturing. These may be prevented by the use of packing around the tube with vaselinized gauze, or passing the tube through a sponge which closely hugs the chest wall.

Scoliosis of the non-rotatory type is usually present in most of the empyemas. It is best overcome by early and thorough removal of the pus. The prevention of chronic empyemas is best overcome by leaving the tube in long enough, by having dependent drainage, the right length of tube (the inner end just within the parietal pleura), the removal of all fibrin at operation, and the prevention of the entrance of foreign bodies either from the rib or equipment used during drainage. Roberts has had the best results in chronic empyema. He uses a preliminary period of proper drainage, resection of ribs in several stages, with closure of the drainage opening for several days following each resection; the parietal pleura and overlying muscles are hinged posteriorly with the excision of extraparietal fibrous tissue posteriorly, and gauze impregnated with flavine and paraffin placed in contact with the flap. Later this is removed and drainage is used in such locations as where adhesions have not formed with external pressure dressing—100 cases with one death. Muscle-flap transplants with thoracoplasty have been generally used.

Putrid empyema has been classified as a clinical entity by Neuhof with tissue necrosis as a predominant feature. It may arise as putrefaction after pulmonary hæmorrhage, necrosis of lung after infarction or trauma, and pleural invasion from anaerobic subphrenic abscess. The onset and course resemble pneumonia, but the pain is local and constant. Foul sputum or odour is diagnostic. Its treatment is immediate evacuation of the pus, adequate aeration with wide "unroofing", and packing with iodoform gauze. Note.—Zinc peroxide as recommended by Meleney might well be used. Infection with spirochætosis and fusospirochætal organisms may be treated in the same manner.

NOTE.—The bibliography includes 196 references.

Men and Books

MEDICINE DURING THE RENAISSANCE

(WANDERINGS IN UNIVERSITY CITIES)

BY EUGÈNE ST JACQUES

Professor in the University of Montreal, Montreal

First of all, what do we call the Renaissance? By common consent, and, as clearly stated by Symonds and Bensusan, it is "that brilliant period of development in æsthetics, art, scholarship, and social and political life which covered the XVth and XVIth centuries." It means in the religious world that striving for liberty of thought and expression which led to unhappy excesses in all quarters. If on the one side we have the Inquisition, on the other we meet with the outburst of intolerance of Luther against those who opposed him, as also the intolerance of the Master of Geneva, Calvin, against the liberty of expression that he claimed for himself, as shown by his burning at the stake of Michel Servetus with all his works because of propositions with which he did not agree.

In the social domain we witness the organization of the common people against the plundering barons, as well as the dawning of a new outlook on life brought about by the inclination towards antiquity.

In the field of letters we find a ferment for a broader outlook springing up everywhere and general knowledge spreading out of the monasteries. Paper was substituted for parchment, which was more expensive, and printing, discovered by Gutenberg in the XVth century, promoted the dissemination of knowledge. Dante created the Italian language. Boccacio established an admirable prose. Petrarch, whose admiration for antiquity was deep, favoured the spreading of its knowledge and taste. Pico de la Mirandola and Erasmus, great humanists that they were, exerted themselves for the free spreading of science and general knowledge.

Was the Renaissance a spontaneous movement? Far from it. In the field of letters, as in others, spontaneous generation is an illusion of the past, not accepted nowadays. True, the VIth, VIIth, and VIIIth centuries had been in Europe a "long winter", as Symonds calls it. If that epoch has been named the Dark Ages it is because the old Greco-Roman civilization had been extinguished by the barbarian Huns, Goths and Vandals, who had emerged from their forests over the Rhine and swept down through Gaul to Italy and Spain, devastating everything under the sun. Knowledge had taken refuge in the monasteries and all through the following centuries the monks were the only people with any culture.

All through this period great minds had been at work, nevertheless. Benedict, the founder of the Benedictine Order in the VIth century, Albertus Magnus, the monk Thomas Aquinas, Roger Bacon, Alcuin, had contributed much to the general knowledge. Bacon had claimed freedom for the scientific mind. For centuries, as Symonds remarks, the Church was the sole repository of learning and culture.

But the major incitors towards a new mode of living and thinking were two great figures, though quite the opposite of one another. They were Francis of Assisi and Petrarch.

Francis of Assisi, in absolute contrast with the stern outlook on life which was still fostered by the Church, proposed to the world to alter its general appreciation on life — to make of religion a sweet thing—to foster charity and good-will towards all. Consequently he stands "pre-eminent as the emotional well-spring and the inspiration of a new pictorial art", says Symonds. "Joy of life in him brimmed irrepressible and spontaneous as from a full cup" (Symonds). As for Petrarch, the humanist, he was indeed a pioneer in the XIVth century in bringing forth the beauties of the ancient civilizations of Greece and Rome, and was thus a nearer promoter of the Renaissance.

Next to Petrarch was the great Byzantine Chrysolaras who came to lecture in Florence under the Medici at the end of the XIVth century. Later, with the fall of Constantinople in the middle of the XVth century (1453) the Greek scholars who already knew the road to Italy flocked in greater numbers to this sunny land, to its universities and academies.

Bologna University had been founded in 1158. Padua had followed in 1222, Sienna in 1248, Perugia in 1266. Salamanca founded in 1246 had attained quite a world-wide reputation. Oxford, born in 1249, had a century later some 14,000 students on its roll call. Nor must one forget the contributions of the Arabs through their translations of the Greco-Roman scholars as well as their own from the universities of Bagdad and Cordova.

Public libraries were few in those days, and nearly all of them were in the monasteries. Cosimo di Medici seems to have been the first promoter of public libraries. Tomasso Parentinelli, protected and encouraged by Pope Nicholas VI, was set to translating the classics into Latin. Then printing gained a vogue, and the great Venetian Aldo Manuzio helped wonderfully the spread of knowledge by the establishment of his printing press.

And so step by step, stone by stone, many bringing each his contribution, knowledge spread and gradually fostered the awakening of the general mind which finally blossomed into the Renaissance.

What part did medicine play during the Renaissance? It was a major one and followed the general trend of progress.

The first figure we meet is Thomas Linacre (1460-1524). He was a man of extensive learning, having first studied at Oxford, then at Bologna and Padua, which were then at the head of the blossoming universities. He was both a great physician and humanist and well versed in the natural sciences for the time.

On his return from Italy he settled in Oxford where he translated into Latin the works of Galen. Having been appointed physician at the Court of Henry VII and later Henry VIII such high position invested him with great authority. He was the founder of the Royal College of Physicians. He taught Greek at Oxford and had as pupils Erasmus and More. In fact he is regarded as the "restorer of learning in England".

Oxford is a most captivating city, "a forest of laced spires", an architectural gem. It offers "unexpected contrasts and charming inconsistencies", for Oxford is " a city of the Middle Ages whose spirit speaks also of tomorrow", as said John Long. Situated along two rivers, the Isis and the Cherwell, amongst meadows of the purest green studded by elms and oaks centuries old, this city is indeed a charming one.

Learning at Oxford is old. Its colleges are centuries old. Was not St. Edmund Hall founded in 1226 and Queen's College in 1390?

What a captivating sight when canoeing on the Cherwell and passing by the Botanical Gardens, Magdalen Tower dominating the ancient bridge comes in the landscape! It is from the top of this tower that a hymn to the rising sun is sung on May 1st.

A walk through High Street brings one in view of St. Mary the Virgin's steeple with its fine porch, and facing it stands University College, one of the oldest of the twenty-one colleges of the city. And if we keep up our wanderings we come to Christ Church College with its thrilling Gothic dining hall, its impressive grand staircase and its marvelous chapel, a gem of Gothic architecture. A turn to the right or the left brings one to the reposeful walk of Merton College with its Tintoretto altar-piece and its chained incunabula in the old library; evidently in those days students were not to be

entirely trusted! Further on we come to New College and its glorious painted window after Reynolds, and the flowered gardens of Wadham nearing those of Worcester College with its enchanting lake adorned with graceful swans. Our hasty walk around the city would take us also towards venerable Balliol, founded in 1268 by the mother of John Balliol, king of Scotland, and its nearby monument to the three martyrs: Thomas Cranmer, Nicholas Riley, Hugh Latimer—testifying to the cruelties of an intolerant religious epoch. Next to it stands the Sheldonian Theatre, home of the severe but always courteous officials, and the venerable All Souls College with its towering dome.

Finally our steps would carry us to the Bodleian Library "the granddad of all English libraries in the world", as Lang calls it, the sanctum sanctorum of Oxford wherein the legacy of by-gone great minds is religiously guarded.

The Bodleian Library is one of six English libraries that enjoys the right to a copy of every book published in the United Kingdom. In size its collections are only surpassed by those of the British Museum and the Bibliothèque Nationale in Paris.

But the sun is setting and Great Tom from the tower of Christ Church announces the closing of the college gates by its ringing 101 strokes—as many as the number of original students of the college plus one.

Oxford is indeed a glorious city with a back ground of centuries-old learning and traditions which have moulded the leaders of England.

Of course Oxford in Linacre's time was not what it is today. Teaching had already been going on for a couple of centuries, and the trend to sport was not what it has become latterly. But the general atmosphere of learning was there and its teachers' renown already stood high.

Two of the most interesting books about Oxford I have read are "Barbara goes to Oxford" by Barbara Burke, and "Lady Connie" by Mrs. Beecher Ward. The second book goes more deeply into the social and university activities: they both brought back many pleasant recollections.

May we mention here a great friend of Linacre's, Leonicenus (1428-1528). He had transcribed in Latin the Aphorisms of Hippocrates and taught medicine in Padua and Bologna. He even corrected some of the errors of Pliny's Natural History!

Of course Cambridge claims an equal part in the fashioning of the leaders. Like Oxford it is steeped in tradition and equally famous as a centre of learning. Both are charming cities for those who prize the value of learning and love quietness and solitude for study.

What more pleasant sight than the backs of King's College in Cambridge, with its glorious chapel. Canoeing and punting are very pleasant on the Cam and one of the nicest nooks on the river is a spot back of King's College facing the meadow of St. John's College. Happy is he whose soul understands the beauty and the enthralling features of such cities as Oxford and Cambridge, which stand unique in their realm!

Let us now cross the Channel in order to point to a great renovator in the field of letters as well as an original propounder of medical thought—Rabelais (1490-1553). Rabelais, who was invested with Holy Orders for a while became a rover. Born at Chinon in the most agreeable of countries, La Touraine, he wandered right and left, gathering observations and data for his strange and immortal Gargantua and Pantagruel. He was amongst the first to translate into Latin the Aphorisms of Hippocrates, of whom he was always a follower, and when, finally, he lectured at Montpellier he commented directly from the Greek text before him, as he was a great humanist—all of which would have gladdened the heart of Linacre.

Montpellier is a quaint ancient city of southern France which has kept many of its old characteristics. The medical faculty adjoins the old cathedral; the old Hôpital St Eloi still stands as well as l'Hôpital Général. Medical teaching is of very old standing in this city; it goes back as far as the Xth century when Arabs and Jews coming from Spain, and Christians, as well, from Salernum began to dispense medical knowledge privately. *Experientia Magistrorum optima*, as says the old parchment. Then in 1220 the medical school was regularly organized by Pope Honorius III. It was from 1530 to 1537 that Rabelais came to Montpellier and taught after Hippocrates, in antagonism to the teachings of Avicenna, chief physician to the Bagdad Hospital, which held sway in those early days.

Paracelsus (1493-1541) was one of the dominant medical figures of the Renaissance. The son of a physician, he directed his studies towards chemistry, physics, and the natural sciences. He opposed the Galenic teachings, reverting to the Hippocratean idea, that observation of the sick was the basis of medicine leading to a good diagnosis and therefrom to a practical therapeutic. He taught in the popular vernacular, and seems to have been at loggerheads with every one, which led him into troublesome adventures.

Born at Einsiedeln, a monastery town near Zurich, he later got his medical degree under Leonicenus in Ferrara, and then wandered all over Europe. He settled in Germany where he attracted a great clientèle. Unhappily, he was truculent and vulgar. His bombastic affirmations aroused antagonism everywhere, for he loudly condemned his predecessors and raised his voice against the dogmatism of the schools. He insisted on the predominance of his personal judgment and was a bit of a charlatan. His knowledge of chemistry led him to propose a therapeutic by chemicals, and he also showed

the virtues of many natural springs as those of Baden, Ems and Ragatz, the quaint little city by the Taormina gorge in the Grison district. Everywhere he went he got into trouble and finally had to leave Basle where he was teaching.

Leonardo da Vinci (1452-1519). And now let us call attention to one of the greatest renovators and minds of the Renaissance.

Leonardo da Vinci is of course looked upon as a master in painting, but he was also of a widely scientific mind. Was he not the first to speak of the aeroplane and make designs for it? He was at the same time a great painter, a sculptor, a mathematician, a military engineer and an architect in all of which he seems to have excelled.

What was his contribution to medicine?—an important one indeed. He dissected and designed most faultlessly the muscular system of the human body, and the plates he produced equal those brought out later by Vesalius. His training began under Verrochio the sculptor. Though he lived mostly in Florence, he was called all over Italy—to Rome, to Bologna, to Milan, where he painted the famous Last Supper in the Convent of Sta Maria delle Gracie, and served Ludovicus as military engineer and architect for his crenellated palace.

Invited finally to France by Francis the Ist he moved to Amboise where he died. All those who have visited the Chateau d'Amboise will remember the beautiful little chapel with its stained windows and attractive façade of St Hubert, where the great scientist is buried, one of the most pleasant spots of the whole of the Touraine region.

Michel Servetus (1509-1553). Born in Spain, Servetus was also one of the leading anatomists of the Renaissance and opened the way to the great discovery of Harvey. After having been a fellow student with Vesalius in Paris under Sylvius—he came to teach in Padua. He entertained liberal ideas for the time and was inclined towards astrology. He was also a pioneer in physiology, for he demonstrated the pulmonary circulation. Up to his time the consensus on the circulation of the blood was rather hazy. The School of Eristratus of Alexandria held that the air was drawn from the lungs into the left ventricle and pumped from it through the arteries to the tissues. The Galenists opposed such a theory and claimed rather that the veins originated in the liver which supplied the blood with nutrient—whilst the arteries originated in the heart which supplied the blood with a hypothetical spirit, just as essential, as nutrient. Of course the physiological part played by the blood and the lung was obscure; it was only gradually that enlightenment came about.

Amongst the anatomists of this period we must single out Sylvius or Dubois, of Paris, who taught Vesalius. But unhappily he turned against his former pupil when Vesalius published his new treatise on anatomy, which confounded his teachings. Up to the coming of Vesalius anatomy was taught according to the findings of Galen, which means many errors. Dissecting of the human cadaver was not held in honour and only seldom done. Frederic the II of Naples, indeed, had authorized human dissection in Salernum, but only once every five years.

Much later Mundinus (about 1275-1290) at Bologna gave the first public demonstration at the beginning of the XIVth century. He followed on the footsteps of Galen and the Arabian masters. Errors were many and they were repeated in the 33 editions of his work which remained the textbook for over a century.

Bologna, which has as its motto *Bologna docet,* had been teaching since the beginning of the XIIIth century. The university buildings of ancient days are as interesting as the old city itself. The streets are bordered by colonades similar to those of the Rue de Rivoli in Paris, offering shelter against rain or sun rays.

The entrance court to the university is imposing. The aula with its old colonnade is impressive, as is also the library rich in ancient manuscripts and incunabula.

Galileo taught in Bologna as also a few women renowned for their scientific achievements, amongst others Laura Bassi who lectured in philosophy. Legend narrates that a woman teacher in anatomy was so good looking that she had to veil her face so as not to provide too many distractions to the students.

The old anatomical theatre in which Mundinus lectured is still there: all the walls are cedar lined and sculptured. On each of the four walls are niches with statues of great medical men: Hippocrates, Galen, Celsius, Mundinus. The amphitheatre stands above a quaint little chapel and history goes to say that during the dissection of the cadaver above, mass was said in the chapel for the repose of the soul of the poor devil.

If Bologna is old as far as teaching goes it is nevertheless quite modern also for all its present university buildings and laboratories are new and its professorial staff is quite modern. It has the double advantage of clinging to its honourable traditions as well as going quite modern.

Bologna still ranks as one of Italy's leading universities with its three main faculties of philosophy, law and medicine and Putti's clinic nearby on the heights.

And now we come to one of the most commanding figures of the time—Vesalius (1514-1564). Of Flemish and medical ancestry Vesalius went first at the age of 14 to Montpellier for his early medical studies. Then he tackled anatomy under Sylvius (Dubois) in Paris. But dissatisfied with the teachings of this Galenist, he went to Padua where he served for five years as prosector in anatomy. At twenty-three years of age he was teaching

anatomy at Padua. His newer descriptions of anatomy were published in 1538 but it was not until 1543 that he produced his masterpiece, *De Fabrica Humani Corporis,* in which he proved the fallacies of Galen. His work fell as a bombshell amidst the medical men who up to the time had followed Galen and relied on pure dogmatic teaching. He was violently opposed by his former teacher Sylvius as well as by his distinguished pupil Eustachius. Dogmatism reigned supreme in those days, and innovators met with stern admonition and resistance.

In fact it seems to have been so through all ages. Was it not so with Servetus whom Calvin burned at the stake? with Galileo who was forced to recant? with Copernicus whose work Melanchthon regarded as godless? with Harvey who met with great opposition, led by Riolan the anatomist of Paris? And what about Lister and Pasteur, nearer to our day? what a long fight before their findings were accepted and their suggestions spread!

Facing great opposition, Vesalius got disgusted and went over to Spain, being honoured by the appointment as the king's physician to Emperor Charles the Vth. But opposition of the bigoted did not relax. Finally, finding the learned bodies against him still, Vesalius left on a pilgrimage to the Holy Land in atonement for his supposed sins, and, unfortunately, solitary and unbefriended, he died on his return journey on the eve of coming back to his old anatomical chair in Padua to which he had been invited to return on the death of Fallopius.

Padua, like Bologna, is an old university town of Italy which has seen past glorious days. The arcade streets, as found in so many of the southern cities, lead us to the University with its elaborate iron gate dedicated to the last war dead. The inside columned court is majestic. All the walls of the ascending stairs and of the aula are covered with the escutcheons of former pupils.

Above the rostrum of the aula stands the gonfalone of the faculty with a standing picture of King Victor Emmanuel. The rows of elaborated and gilded arm-chairs are there for the guests. Every thing looks very solemn, as befits an "aieule".

Our walk through the sleepy streets takes us necessarily to the public square on which stands the equestrian statue of the masterful condottiere Gattamelata by Donatello, and next to it the Basilica of San Antonio, the patron saint of the city. This grand temple is surely worth a visit by any one in the least interested in the art movement of the time and by those religiously inclined. Italy was then fired by the spirit of the Renaissance and works of art of all description sprang up every where, the genius of its children producing with profusion masterpieces in architecture, sculpture, and painting as well as jewellery still unsurpassed and seldom equalled.

Let us single out again Eustachius (1524-1579), a pupil of Vesalius who turned against his master though he himself discovered many new things, as the Eustachian canal, the thoracic duct, the suprarenals and the origin of the optic nerves.

Fallopius (1523-1569), another pupil of Vesalius and the discoverer of the Fallopian tube. To his credit it may be said that he stood fast by his teacher and has left an honourable name.

Let us not forget, either, Fabricius ab Aquapendente (1537-1617) who taught anatomy at Verona and is best remembered by the fact that he rendered possible William Harvey and his epoch-making discovery.

And last, but not least, let us close this series with the brilliant figure of Ambroise Paré (1510-1592). Born in France at Laval on the Mayenne, country of good cheese and wine as well as good cheer, this honest and fearless Huguenot was a barber-surgeon as those who practised surgery were then called. The internists were as haughty as they were ignorant, and looked down on their colleagues the surgeons. We all know with what irony Molière later depicted these gentry in Le Malade Imaginaire. The best they could advise, so far as therapeutics went, was *saignare, purgare* and *clystare.*

Paré had a decidedly inventive mind. Up to his time after an amputation the surgeon used to pour boiling oil over the stump and cauterize it with a red hot iron to stop the flow of blood. One can easily imagine the agonizing pain suffered by the patient. Paré had the luminous idea of using the garotte. Then to prevent post-operative bleeding he inaugurated something new. He was then acting as military surgeon at the siege of Metz and there for the first time he used a clamp to seize the bleeding vessels and then ligated them. All this seems so very simple to us but it was a major novelty in those days. History tells us that the night following this new departure he lay sleepless in his tent. Rising early he went to see his patients and found them resting in relative comfort whilst those who had been cauterized and had boiling oil sprinkled were rolling in anguish on their couches. So this was the point of departure of the use of the forci-pressure clamp and the ligating of the arteries. So Paré can truly be said to be one of the few medical men who were true benefactors of suffering humanity. With him one can class Hippocrates, who liberated the profession from the grasp of the Asclepiades, Jenner and Pasteur who led us on the road of a new therapeutical method; Morton who discovered the use of general anæsthesia by ether; and Lister, who renovated surgery. These men may truly be looked upon as real benefactors of humanity at large.

Association Notes

THE SEVENTY-SECOND ANNUAL MEETING

of the

Canadian Medical Association

TO BE HELD IN WINNIPEG, JUNE 23, 24, 25, 26, 27, 1941

Convention Headquarters—Royal Alexandra Hotel

President - - - DR. DUNCAN GRAHAM, Toronto
President-Elect - - DR. GORDON S. FAHRNI, Winnipeg
General Secretary - - DR. T. C. ROUTLEY, Toronto

Plans for the Seventy-second Annual Meeting, to be held in Winnipeg during the week of June 23rd next, are progressing most satisfactorily.

The Central Program Committee, under the Chairmanship of Dr. Duncan Graham, with valuable aid from the Local Program Committee in Winnipeg, has arranged a scientific program which should attract a large attendance.

General Council will meet on Monday and Tuesday.

On Tuesday afternoon both the Manitoba and Saskatchewan Divisions of the Association will hold their annual meetings.

The fourth annual conference of Medical Secretaries will be held on Monday evening.

The Canadian Medical Protective Association will hold its Annual Meeting at the close of the luncheon on Friday.

On Tuesday evening, members of General Council will be dinner guests of their Manitoba hosts.

Round-Table Conferences, instituted so successfully two years ago, will be continued this year on the mornings of Wednesday, Thursday and Friday, from nine to ten o'clock.

General Sessions will be held on Wednesday, Thursday and Friday mornings from 10.15 o'clock until 12.00 noon.

The various sections will hold their meetings on the afternoons of Wednesday, Thursday and Friday.

The Annual General Meeting will be held on Wednesday night.

Once again, as at the Toronto meeting, Thursday night has been given over to a dinner meeting under the auspices of the **Committee on Medical Economics**, of which Dr. Wallace Wilson, of Vancouver, is the Chairman.

Golfers are reminded that the Golf Tournament will be held all day Tuesday, when play for the beautiful Ontario Cup and other prizes will take place.

All the meetings will be held in the Royal Alexandra Hotel. The management has very kindly placed at our disposal the entire facilities of the hotel, thus affording splendid accommodation for all our requirements.

COMMITTEE ON ARRANGEMENTS

Chairman
THE PRESIDENT-ELECT, DR. G. S. FAHRNI
General Secretary
DR. T. C. ROUTLEY, TORONTO
Local Honorary Secretary
DR. A. W. S. HAY

Chairmen and Secretaries of Committees

BADGES AND SIGNS—DR. A. BLONDAL, *Chairman.*
DR. L. A. SIGURDSON, *Secretary.*

COMMERCIAL EXHIBITS—DR. E. H. ALEXANDER, *Chairman.*
DR. H. MEDOVY, *Secretary.*

ENTERTAINMENT—DR. H. D. KITCHEN, *Chairman.*
DR. A. M. GOODWIN, *Secretary.*

GOLF—DR. G. L. ADAMSON, *Chairman.*
DR. I. O. FRYER, *Secretary.*

HOUSING AND EQUIPMENT—DR. J. M. MCEACHERN, *Chairman.*
DR. K. C. MCGIBBON, *Secretary.*

PUBLICITY—DR. W. F. ABBOTT, *Chairman.*
DR. F. G. ALLISON, *Secretary.*

REGISTRATION—DR. W. E. CAMPBELL, *Chairman.*
DR. EMMET DWYER, *Secretary.*

SCIENTIFIC EXHIBITS—DR. SARA MELTZER, *Chairman.*
DR. H. V. RICE, *Secretary.*

TRANSPORTATION—DR. M. R. MACCHARLES, *Chairman.*
DR. B. R. MOONEY, *Secretary.*

FINANCE—DR. F. G. MCGUINNESS, *Chairman.*
DR. W. G. BEATON, *Secretary.*

LIAISON WITH LADIES' COMMITTEE—DR. P. H. T. THORLAKSON, *Chairman.*
DR. B. D. BEST, *Secretary.*

Chairmen and Secretaries of Sections

ANÆSTHESIA—DR. D. C. AIKENHEAD, *Chairman.*
DR. D. G. REVELL, *Secretary.*

DERMATOLOGY—DR. A. M. DAVIDSON, *Chairman.*
DR. GEO. BROCK, *Secretary.*

MEDICINE—DR. J. D. ADAMSON, *Chairman.*
DR. D. S. MCEWEN, *Secretary.*

OBSTETRICS AND GYNÆCOLOGY—DR. J. D. MCQUEEN, *Chairman.*
DR. C. R. RICE, *Secretary.*

OPHTHALMOLOGY AND OTOLARYNGOLOGY—DR. E. J. WASHINGTON, *Chairman.*
DR. F. A. MACNEIL, *Secretary.*

Chairmen and Secretaries of Sections— *Continued.*

PÆDIATRICS—DR. GORDON CHOWN, *Chairman.*
DR. HAROLD POPHAM, *Secretary.*

RADIOLOGY—DR. DIGBY WHEELER, *Chairman.*
DR. R. A. MACPHERSON, *Secretary.*

SURGERY—DR. O. S. WAUGH, *Chairman.*
DR. S. G. HERBERT, *Secretary.*

UROLOGY—DR. H. D. MORSE, *Chairman.*
DR. D. SWARTZ, *Secretary.*

HISTORICAL MEDICINE—DR. ROSS MITCHELL, *Chairman.*
PROF. I. MACLAREN THOMPSON, *Secretary.*

MILITARY MEDICINE—COLONEL P. G. BELL, *Chairman.*
LIEUT.-COLONEL T. E. HOLLAND, *Secretary.*

Local Program Committee

Chairman—DEAN A. T. MATHERS
Secretary—DR. C. W. BURNS

Drs. D. C. Aikenhead, A. M. Davidson, J. D. Adamson, J. D. McQueen, E. J. Washington, Gordon Chown, Digby Wheeler, O. S. Waugh, H. D. Morse, Ross Mitchell and Colonel P. G. Bell.

Local Advisory Committee

Chairman—DR. G. S. FAHRNI, PRESIDENT-ELECT
Hon. Secretary—DR. A. W. S. HAY

Dr. E. L. Ross, President, Manitoba Medical Association; Dr. H. D. Kitchen, Vice-President, Manitoba Medical Association; Dr. Digby Wheeler, President, Winnipeg Medical Society; Dr. J. S. McInnes, President, College of Physicians and Surgeons of Manitoba; Dr. A. T. Mathers, Dean of Faculty of Medicine, University of Manitoba; Dr. O. C. Trainor, Manitoba representative on Canadian Medical Association Executive Committee; Dr. J. D. Adamson, Professor of Medicine, University of Manitoba; Dr. A. F. Menzies, Southern District; Dr. H. O. McDiarmid, Central and Western Districts; Dr. R. E. Dicks, Northern part of province.

Ladies' Committee

Convener—MRS. G. S. FAHRNI

Mrs. A. W. S. Hay, Mrs. H. D. Kitchen, Mrs. Digby Wheeler, Mrs. J. S. McInnes, Mrs. A. T. Mathers, Mrs. O. C. Trainor, Mrs. J. D. Adamson, Mrs. A. F. Menzies, Mrs. H. O. McDiarmid, Mrs. R. E. Dicks, Mrs. E. L. Ross, Mrs. P. H. T. Thorlakson.

GENERAL SESSIONS

Speakers and Subjects as Arranged to Date

Valedictory Address by the President
Dr. Duncan Graham, Toronto.

Dr. William F. Braasch, Rochester, Minn.
The surgical kidney as a factor with hypertension.

Dr. Charles Hunter, Winnipeg
Dizziness from the internist's standpoint.

Dr. F. W. Jackson, Winnipeg
Some observations on maternal care.

Dr. A. F. Menzies, Morden
Post-war medical problems.

Dr. Gavin Miller, Montreal
Recent advances in the surgical approach to carcinoma of the large bowel and rectum.

Dr. Rustin McIntosh, New York
Jaundice.

Dr. Kenneth G. McKenzie, and
Dr. E. H. Botterell, Toronto
The common neurological syndromes produced by pressure from extrusion of the intervertebral disc. (Illustrated by coloured film).

Dr. G. E. Richards, Toronto
Ten years' progress in the radiotherapy of oral cancer. Present methods and present results.

Dr. C. D. Parfitt, Toronto
The Osler Lecture.

Dr. Wallace Wilson, Vancouver
Whither Medicine!

Dr. Ralph M. Tovell, and
Dr. Curtiss B. Hickcox, Hartford, Conn.
The present status of cyclopropane.

SECTIONAL MEETINGS

Section of Anæsthesia

Dr. D. H. Huggins, Winnipeg
Avertin in neuro-surgery.

Dr. D. G. Revell, Winnipeg
Ether, the all-purpose anæsthetic.

Dr. H. V. Rice, Winnipeg
Newer concepts of anæsthetic physiology.

Dr. C. H. Robson, Toronto
Anæsthesia for children (illustrated by coloured film).

Dr. R. M. Tovell, and
Dr. A. W. Friend, Hartford, Conn.
The control of physical hazards of anæsthesia.

Section of Anæsthesia—*Continued.*

Symposium on Spinal Anæsthesia

Dr. Byron R. Burwash, Saskatoon
Analeptics.

Dr. I. H. Davidson, Winnipeg
Pre-medication.

Dr. K. E. Hollis, Toronto
Indications and contraindications.

Dr. H. J. Shields, Toronto
Physiology.

Dr. G. D. Stanley, Calgary
Post-operative sequelæ.

Dr. J. E. Murphy, Regina
Agents.

Section of Historical Medicine

Dr. William Boyd, Toronto
The evolution of medical science.

Dr. J. H. Elliott, Toronto
Osler's class at the Toronto School of Medicine.

Dr. W. A. Gardner, Winnipeg
Dr. O'Reilly, Napoleon's physician at St. Helena.

Dr. J. A. Gunn, Winnipeg
Ambroise Paré as a military surgeon.

Dr. J. C. Hossack, Winnipeg
History of the plague.

Dr. D. S. Macnab, Calgary
Hugh Owen Thomas.

Dr. A. G. Nicholls, Montreal
Herba panacea.

Dr. N. R. Rawson, Winnipeg
William Farr, founder of vital statistics.

Dr. D. G. Revell, Edmonton
The first twenty-five years of anatomy teaching in Alberta.

Section of Medicine

Dr. G. F. Amyot, Victoria
Public health and the private practice of medicine.

Dr. Eldon M. Boyd, Kingston
Expectoration, expectorants and cough medicines.

Dr. William Boyd, Toronto
Changing views regarding pyelonephritis.

Dr. F. T. Cadham, Winnipeg
Vaccine therapy in arthritis.

Dr. R. J. Collins, East Saint John
Problems arising in rehabilitation schemes for the tuberculous.

Dr. J. H. Geddes, London
What is colitis?

Dr. Wallace Graham, and
Dr. A. A. Fletcher, Toronto
Gold therapy in chronic arthritis.

Dr. F. C. Heal, Moose Jaw
The management of common disorders of cardiac rhythm.

Dr. E. S. Mills, and
Dr. E. S. Murray, Montreal
The relative value of the various sulphonamide drugs in the treatment of acute respiratory infections including pneumonia.

Dr. J. M. McEachern, Winnipeg
Coronary disease in Manitoba.

Section of Medicine—*Continued.*

Dr. D. S. McEwen, Winnipeg
Upper respiratory infection in general practice.

Dr. Harris McPhedran, Toronto
Cardiovascular disease associated with toxic goitre.

Dr. Trevor Owen, Toronto
Fatigue, rest and exercise.

Dr. T. A. Pincock, Brandon
Transitions in psychiatry.

Dr. John W. Scott, Edmonton
The natural history of migraine.

Dr. S. E. C. Turvey, Vancouver
Asymptomatic neurosyphilis.

Section of Military Medicine

Symposium—Medical aspects of casualties returning from overseas.

Introduction—
Lieut.-Colonel A. M. Davidson, President, Standing Medical Board, No. 10 Detachment, R.C.A.M.C., M.D. 10.

Medical Cases—
Captain H. S. Atkinson, No. 10 Detachment, R.C.A.M.C.
Dr. J. D. Adamson, Medical Staff, D.P.&N.H., Winnipeg.

Surgical Cases—
Lieut.-Colonel T. E. Holland, R.C.A.M.C., Officer Commanding, Fort Osborne Military Hospital, M.D. 10.
Dr. J. A. Gunn, Surgeon, D.P.&N.H., Winnipeg.

Eye, Ear, Nose and Throat Cases—
Major H. G. Grieve, No. 10 Detachment, R.C.A.M.C.

Problems of Army Hygiene
Major M. R. Elliott, District Hygiene Officer, No. 10 Detachment, R.C.A.M.C.

Special problems of the R.C.A.F. Medical Officer
Wing-Commander G. E. Hall, Ottawa.

Section of Obstetrics and Gynæcology

Dr. L. C. Conn, and
Dr. J. R. Vant, Edmonton
Uterine prolapse.

Dr. Léon Gérin-Lajoie, Montreal
Contribution to the surgery of the pre-sacral nerve in gynæcological ailments.

Dr. W. S. Holmes, Saskatoon
Induction of labour—indications, methods and dangers.

Section of Obstetrics and Gynæcology— *Continued.*

Dr. P. J. Kearns, Montreal
Anatomical changes in the lower uterine segment in pregnancy and labour.

Dr. John Mann, Toronto
Toxæmia of pregnancy; present day classification; etiology and treatment.

Dr. F. G. McGuinness, Winnipeg
The obstetrical significance of intra-cranial injury of the newborn, based on 300 autopsies.

Dr. A. B. Nash, Victoria
Treatment of acute and chronic salpingitis.

Dr. N. W. Philpott, Montreal
Anæsthesia and analgesia in obstetrics with particular reference to the use of local anæsthesia.

Dr. C. R. Rice, Winnipeg
Disturbances of menstrual function in tuberculous patients.

Section of Ophthalmology

Dr. K. J. Austmann, Winnipeg
Glaucoma.

Dr. D. M. Genoff, Winnipeg
Senile cataract.

Dr. H. O. McDiarmid, Brandon
Intraocular tumours.

Dr. F. D. McKenty, Winnipeg
The results of tarsectomy and a simplification of the technique.

Dr. Fred T. Tooke, and
Dr. John V. Nicholls, Montreal
The incidence and character of hæmorrhages occurring in the retina in diabetes.

Section of Otolaryngology

Dr. G. W. Fletcher, Winnipeg
Tumours of the larynx—diagnosis and treatment.

Dr. Keith Hutchison, Montreal
Acute otitic meningitis; chemotherapy advances.

Dr. Gregor McGregor, Toronto
Bronchoscopy — a safeguard against diagnostic errors.

Dr. George Tremble, Montreal
Irrigation of the sphenoid sinuses — a safe and simple method (illustrated by coloured film).

Dr. E. J. Washington, Winnipeg
Intracranial complications of otogenous origin with review of cases.

Clinical presentation of cases at the General Hospital and St. Boniface Hospital.

Section of Pædiatrics

Dr. A. R. Birt, Winnipeg
Troublesome skin diseases in infancy and childhood.

Dr. Alan Brown, Toronto
Diarrhœa.

Dr. Alfred Deacon, Winnipeg
Rehabilitation of poliomyelitis cases.

Dr. Donald Fraser, Toronto
Prophylactic immunization in children.

Dr. U. J. Gareau, Regina
Acrodynia.

Dr. Alton Goldbloom, Montreal
Staphylococcus septicæmia.

Dr. K. B. Leslie, Winnipeg
Medication before and after anæsthesia in children.

Dr. L. M. Lindsay, and
Dr. F. W. Wiglesworth, Montreal
Purpura fulminans.

Dr. H. S. Little, London
Chemotherapy of meningococcal meningitis.

Dr. Rustin McIntosh, New York
Nephritis.

Dr. Graham Ross, Montreal
The use of vitamin K in pædiatric practice, with special reference to the newborn period.

Dr. R. R. Struthers, Montreal
The significance of rheumatic nodules.

Dr. F. F. Tisdall, Toronto
War and post-war problems regarding childhood nutrition.

Section of Radiology

Dr. L. J. Carter, Brandon
Radiological examination of the terminal ileum and proximal colons—a twenty-five year résumé.

Dr. A. D. Irvine, Edmonton
Coarctation of the aorta, radiologically considered.

Dr. Herve Lacharité, Montreal
Osteochondritis dissecans.

Dr. W. H. McGuffin, Calgary
Radiological evidence as a diagnostic aid in diseases of the heart.

Dr. C. B. Peirce, and
Dr. Arthur T. Henderson, Montreal
X-ray therapy in intractable asthma.

Section of Radiology—*Continued.*

Symposium on Carcinoma of the Cervix

Anatomy—
Professor I. Maclaren Thompson, Winnipeg.

Pathology—
Dr. Sara Meltzer, Winnipeg.

Radium—
Dr. Ethlyn Trapp, Vancouver.

X-radiation—
Dr. A. W. Blair, Regina.

Metastasis and management—
Dr. B. R. Mooney, Winnipeg.

Complications following radiation treatment in carcinoma of the cervix—
Dr. W. G. Cosbie, Toronto.

Section of Surgery

Dr. A. C. Abbott, Winnipeg
Inguinal hernia with special reference to recurrence.

Dr. C. W. Burns, Winnipeg
Surgical management of traumatic abdomen.

Dr. Walter G. Carscadden, Toronto
Injuries of the hand.

Dr. W. F. Gillespie, Edmonton
The treatment of perianal abscess and fistula.

Dr. Chas. W. Harris, Toronto
Injuries about the ankle joint.

Dr. Robert C. Laird, Toronto
The diagnosis and treatment of bronchiectasis.

Dr. R. K. Magee, Peterborough
Subphrenic abscess.

Dr. Herbert Meltzer, Ninette
181 cases of thoracoplasty.

Dr. H. F. Moseley, Montreal
Shoulder pain.

Dr. M. R. MacCharles, Winnipeg
Causes of poor results in biliary tract surgery.

Dr. Lorne H. McConnell, Saskatoon
Epilepsy — analysis of the results of 91 craniotomies.

Dr. J. S. McEachern, Calgary
Some surgical problems arising from developmental errors.

Dr. O. W. Niemeier, Hamilton
Obstructive jaundice.

Section of Surgery—*Continued.*

Dr. George Ramsay, London
Anterior poliomyelitis; observations on recovery rate of paralyzed muscles.

Dr. Fulton Risdon, Toronto
The present status of the treatment of hare lip and cleft palate deformities.

Dr. Dudley E. Ross, and
Dr. J. H. Palmer, Montreal
The surgical treatment of patent ductus arteriosus.

Section of Urology

Dr. E. D. Busby, London
Present status of chemotherapy in urinary infections.

Dr. W. F. Braasch, Rochester, Minn.
Prognosis in non-surgical bilateral renal tuberculosis.

Dr. W. A. Dakin, Regina
Pathology of some unusual types of gross renal hæmorrhage.

Dr. Earl Hall, Vancouver
Carcinoma of the penis.

Dr. J. C. McClelland, Toronto
Anuria.

Dr. Frank S. Patch, and
Dr. J. T. Codnere, Montreal
Treatment of hydronephrosis secondary to aberrant renal vessels.

Dr. Frederick Pilcher, Calgary
Transurethral prostatic resection.

Dr. Emerson Smith, Montreal
Experiences with interstitial cystitis

Dr. C. B. Stewart, Winnipeg
Persistent Wolffian duct—report of cases.

Dr. G. N. Tucker, Edmonton
Recumbency urolithiasis.

Medical Economics

Municipal doctor system in Saskatchewan
Dr. R. O. Davison, Regina.

What is an adequate medical service?
Dr. E. S. Moorhead, Winnipeg.

Some of the weaknesses observed in health insurance plans which have been studied.
Dr. T. C. Routley, Toronto.

Summary
Mr. Hugh H. Wolfenden, Toronto, Consulting Actuary of the Association.

ROUND-TABLE CONFERENCES

Subjects and Chairmen

Medicine

Migraine
Dr. G. L. Adamson, Winnipeg.

Normal blood pressure variations
Dr. L. G. Bell, Winnipeg.

Prevention of common cold
Dr. William Wood, Winnipeg.

Obstetrics and Gynæcology

Management of ante- and post-partum hæmorrhage
Dr. Ross Mitchell, Winnipeg.

Carcinoma of the uterus
Dr. J. D. McQueen, Winnipeg.

Ophthalmology

Orthoptic treatment of strabismus
Dr. F. A. McNeil, Winnipeg.

Corneal lesions
Dr. J. T. Cruise, Winnipeg.

Otolaryngology

Upper respiratory infections
Dr. Robert Black, Winnipeg.

Pædiatrics

Chronic cough in childhood
Dr. O. J. Day, Winnipeg.

Genito-urinary infections in childhood
Dr. C. B. Stewart, Winnipeg.

Surgery

Fractures
Dr. A. Gibson, Winnipeg.

Acute appendicitis
Dr. P. H. T. Thorlakson, Winnipeg.

Tumour clinic
Dr. Daniel Nicholson, Winnipeg.

Urology

Bladder tumours
Dr. H. D. Morse, Winnipeg.

The present status of endocrine therapy in urology
Dr. C. B. Stewart, Winnipeg.

TRANSPORTATION

Identification certificates may be obtained from the office of the General Secretary, 184 College Street, Toronto. These certificates entitle the purchaser to round-trip fare at one and one-third of the adult normal one-way first class or coach fare, plus 25 cents. Tickets are good going and returning via same route, or going via one authorized route and returning via any other authorized route. Return limit, thirty days, in addition to date of sale. Passengers must reach original starting point not later than midnight of final return limit.

Dates of sale:

From Ontario (Port Arthur, Armstrong and West), Manitoba Saskatchewan, Alberta and British Columbia—June 17th to 23rd (both dates inclusive).

From Ontario (east of Port Arthur and Armstrong), Quebec, New Brunswick, Nova Scotia, and Prince Edward Island, June 16th to 24th (both dates inclusive).

Hospital Service Department Notes

Hospital Staff Meetings

Hospital staff meetings and sessions of clinical societies in hospitals take various forms, some more interesting than others. The problem is to provide a program that will be sufficiently varied to appeal to all, proceed without lag, and provide "something different". One of the most intensely interesting meetings attended in many years took place recently at the Royal Victoria Hospital in Montreal and illustrated a type of program which might well be considered for adoption on occasion in other hospitals. This particular gathering was a hospital meeting of the Montreal Medico-Chirurgical Society.

A large ward had been specially set up for the occasion. Cases for demonstration occupied the various beds on each side. The doctor demonstrating each case remained close by to point out the features of the disease and to explain charts, photographs, and other data arranged on the walls behind the patient. Where necessary, microscopes or biopsy material were set up on the bedside table. The centre of the ward was filled with x-ray view boxes, photographs, and other exhibits. At the far end of the ward a projection machine showed coloured moving pictures prepared by various members of the staff. The side rooms leading from the corridor contained pathological, ophthalmic, gynæcological and other exhibits. All exhibits, whether of patients or of laboratory preparations, were adequately labelled with titular or explanatory signs. Altogether some forty-six different exhibits were presented.

On arrival, each visitor was handed an extensive, hectographed program, giving a diagram of the ward and setting forth the particular title and the name of the doctor in charge of each of the forty-six exhibits. This program also gave a synopsis of each of the exhibits and the case

All communications intended for the Department of Hospital Service of the Canadian Medical Association should be addressed to Dr. Harvey Agnew, 184 College Street, Toronto.

histories of the patients. In this way it was possible for the many visitors to work up and down the ward, picking out the exhibits of interest and obtaining from the program a general conception of each disease or condition demonstrated.

After an hour and a half of passing from one exhibit to another, the large audience moved to a nearby auditorium in the nurses' residence, where they heard an excellent talk from the new medical superintendent of the hospital, Dr. George F. Stephens, on, "Where the Staff Doctor and Patient and Hospital Agree—or Should". This talk, which laid particular emphasis upon the benefits of hospital care insurance, elicited an animated and favourable discussion at its close, following which refreshments were served.

This type of clinical meeting does require a good deal of preparation. Much responsibility was thrown on the Committee, which was under the chairmanship of Dr. J. S. L. Browne, as the patients and exhibits had to be arranged for, signs and programs had to be printed, special wiring had to be arranged for the many microscopic and radiological exhibits, and the co-operation of the doctors demonstrating the exhibits had to be secured. Nevertheless, the program was well worthwhile. A full attendance of the local society was assured, and every doctor attending was able to concentrate on those subjects of particular interest to himself. With such a wide variety of exhibits, ranging all the way from Löffler's syndrome to marrow transfusion, every visitor would find something of interest to him.

Smaller hospitals could modify this arrangement to suit the local situation. G.H.A.

The War

The First Canadian Division Medical Society

The third meeting of the First Canadian Division Medical Society was held at a central location, somewhere in England, on the afternoon of December 14, 1940. The Vice-president, Lieut.-Colonel H. M. Elder, occupied the chair.

Capt. H. T. Ewart presented a paper on Gastro-intestinal Disturbances. He reviewed the incidence of these disturbances in the Field, and the frequency with which they terminated in duodenal ulcer. A classification of the types was offered, predisposing causes discussed, and in concluding certain recommendations concerning disposal of the cases were suggested.

Dr. J. Trueta, at present carrying on research work at the Dunn School of Pathology, Oxford, gave an illustrated lecture on the treatment of wounds and fractures in the Spanish Civil War. As a civilian surgeon on the Republican side, Dr. Trueta was actively engaged in treating casualties occurring in Barcelona. He gave a clear description of his technique for effective débridement of the wound, gauze packing, and immobilization of the injury in plaster of Paris. As a result of this procedure, there was a noteworthy drop in the frequency of gas-gangrene infection and the mortality was considerably reduced.

Clinical meetings during the month at 5 Canadian General Hospital and 15 Canadian General Hospital were each attended by ten medical officers from the Division. The staffs of the hospitals presented an interesting program of clinical subjects and case presentations on each day.

During the month, ten of the Divisional medical officers attended refresher courses as indicated: Major C. D. Gossage, Medicine, 15 Canadian General Hospital; Capt. C. E. Corrigan, Surgery, 5 Canadian General Hospital; Capt. C. U. Letourneau, Surgery, Royal Infirmary, Edinburgh; Capt. J. P. McInerney, Surgery, Royal Infirmary, Edinburgh; Capt. J. G. McCarroll, Obstetrics and Gynæcology, Glasgow University, Glasgow; Capt. B. A. MacLeod, Surgery, Glasgow University, Glasgow; Major C. H. Playfair, Medicine, Aberdeen Infirmary, Aberdeen; Capt. T. C. Gibson, Medicine, Royal Infirmary, Edinburgh; Major C. V. Ward, Obstetrics and Gynæcology, Samaritan Hospital, Glasgow; Capt. D. W. Sparling, Obstetrics and Gynæcology, Samaritan Hospital, Glasgow.

A Survey Reveals the Civilian Hospital Facilities Available in Case of Emergency

The Canadian Hospital Council has completed a survey of civilian hospital facilities and personnel which would be available for use by the Federal Government should a national emergency require the utilization of these facilities. This survey was conducted in co-operation with the Department of Pensions and National Health. Although the utilization of these facilities is not contemplated, it was considered advisable that this information should be available in case of sudden need.

This questionnaire was sent to general hospitals of fifty beds or over and to tuberculosis sanatoria. Undoubtedly many hospitals under fifty beds could supply accommodation, but, as most of these are located in smaller communities, it was not considered that they would be adaptable for military use in emergency, except, perhaps, for the care of casualties occurring in the local area.

The replies elicited the following information:

Beds available in case of national emergency	7,200
Additional space which could be set up	5,277
Total beds available in case of emergency ..	12,477

Very few hospitals have more beds than they need during the peak periods. However, it was apparent that some institutions felt that they

could move some patients more rapidly than in the past, that civilian admissions could be reduced to the more serious patients, and, in some cases, that the entire institution could be turned over to the government and civilian needs left to other hospitals. Some hospitals, too, had certain space or floor space not now used for bed accommodation which could be utilized temporarily if it be necessary to find space for additional beds. In some cases space not the property of the hospital but adjacent to it was mentioned as space that could be pressed into service and operated by the hospital staff if necessary.

Replies were received from approximately two-thirds of the hospitals. These would indicate a total figure for Canada roughly 40 to 50 per cent greater than the figures given above.

PERSONNEL

Inquiry was made also concerning the number of personnel of selected types who could be spared in emergency without seriously handicapping civilian care. Most hospitals replied that they were getting along with a minimum staff but in a number of instances it was felt that certain of the personnel could be reduced temporarily, if absolutely necessary, either for war service or to replace others who would be acceptable for war service. The number available, however, was very few and indicates that hospitals as a whole are certainly not overstaffed.

Graduate nurses on the hospital staff who could be spared	387
Graduate dietitians	28
Occupational therapists	15
Clinical laboratory technicians, male	8
female	33
Radiological technicians, male	12
female	25
Pharmacists, male	1
female	11
Total available	520

Inquiry was made too concerning the number of technicians who could be taken in for short courses of training. It was found that hospitals were prepared to provide short courses of training, if necessary, for 183 radiological technicians and for 189 clinical laboratory technicians. However, as no minimum standard of training was outlined, and as some of the hospitals replying in the affirmative are none too well equipped for the training of technicians, it is quite probable that, should the need for the training of such be obvious, some discrimination in the selection of hospital laboratories for such training would be made.

A more complete analysis of the survey is provided in the February issue of *The Canadian Hospital*. G.H.A.

British Medical Arrangements for Air-raid Victims

To take care of the victims of air-raid casualties in England, Dr. George F. McCleary, former Deputy Senior Medical Officer of the British Ministry of Health, in the leading article in the new journal *Medical Care*, writes that the British nation has organized its entire hospital system, both public and private institutions, under government direction. The Prime Minister, Winston Churchill said to the House of Commons on October 8th last that when Britain entered the war air-raid casualties up to 3,000 killed and up to 12,000 wounded in a single night were expected. The actual number, however, has been far less than this, so that the arrangements made for medical care have thus far been more than ample. But provision must be made for future emergencies which still cannot be definitely forecast, and which may be much larger than have yet occurred.

Under the British plan, England and Wales are divided into ten regions, each under the direction of an officer responsible to the Ministry of Health, and the hospital arrangements are planned in each region so that injured persons will not be retained for more than a few hours in hospitals which are in the areas most exposed to attack. As rapidly as possible they are moved to hospitals in safer localities. Elaborate arrangements have been made for safe and speedy transportation.

In 1938 the Ministry of Health made a hospital survey showing 370,000 beds in existing hospitals, not including institutions for mental disease. About one-third of these beds were in non-governmental and about two-thirds in governmental hospitals. With almost no additional construction arrangements were made so that, to meet emergencies, the number of available beds could be almost doubled. When an emergency arises, hospitals in an area must send home at once all patients not urgently in need of continued hospital treatment. A total of 100,000 beds can thus be cleared. Many additional beds, up to a total of 150,000, can be set up in existing hospitals as emergency needs require. Only about 40,000 beds have been provided by the new construction of so-called "huts" of a temporary character.

The medical profession of Britain has been organized for war purposes. The arrangements are designed to provide general physicians and specialists for emergency needs in cities, and also to furnish physicians required for munitions workers and their families who have gone to new centres of industrial activity. On the other hand, many persons, chiefly children, have been moved from areas likely to be exposed to continuous air attack. These changes in the distribution of the population have been allowed for in the plans for providing physicians and hospital facilities.

In the German air raids last autumn, St. Thomas's Hospital, one of the oldest and best-known teaching hospitals in Britain, was badly damaged by three direct hits in six days, but, by scattering its medical students among other hospitals according to a prearranged plan, was able to start the 1940 session of its medical school on the usual day. One of its officials remarked after the bombings: "We do not intend to be pushed out by Hitler or anyone else." The teaching of medical students throughout England has been reorganized with this aim in view, distributing much of the work over many hospitals, instead of, as formerly, having it concentrated in a few.—From *Medical Care,* New York.

Cerebrospinal Meningitis

We are now entering on the season when an increase in the incidence of cerebrospinal meningitis is to be expected; and a rise is in fact occurring, though so far it is relatively small. It may therefore be of some interest to note the lessons that we learned during the major outbreak that occurred in the winter and spring of last year. The essential fact that emerged from that experience was the vital importance of early diagnosis. It is clear that the sulphonamide compounds, and particularly, perhaps, sulfapyridine, have placed in our hands a remedy which, if it is used in time, will reduce the mortality from this disease to a small fraction of its former dimensions. It is easier to secure early diagnosis among troops under discipline than among the civil population, if only because in civilian life the doctor may be called in too late; and the experience of last spring made it clear that many lives were being lost that would have been saved if treatment had been instituted more promptly. The practitioner can play a vital part in reducing the case mortality from this disease by exercising a constant watchfulness for the earliest symptoms, by having the cerebrospinal fluid tested promptly in any doubtful case, and by giving precautionary and adequate doses of sulfapyridine, or of sulfanilamide, while a bacteriological diagnosis is being established. Care should, of course, be taken to discontinue the drug if the laboratory findings are negative, and to inform any hospital to which a case is admitted of the exact doses that have already been given. The other lesson that we learned last year, though many had taught it before, was the uselessness of swabbing contacts. It has become clear that carrier rates of 50 per cent or more may be found in large sample swabbings of aggregations of men among whom few or no cases are occurring. In these circumstances the isolation of a few unfortunate carriers will produce no significant decrease in the risk of infection to which others are subjected; while the inconvenience and mental distress resulting from such isolation are by no means negligible. Beyond sending to hospital or isolating the actual case our efforts may be confined to the avoidance of overcrowding, and to any other procedure that is likely to reduce the risk of the passage of bacteria from one person's nasopharynx to that of another. In the light of our present knowledge the swabbing of contacts should be discontinued.—*Brit. M. J.*, 1941, **1**: 164.

Military Medicine

It is natural, when most doctors are either on war service or concerned with the results of the air war on civilians, that there should be an increasing demand for papers on all aspects of war medicine. American doctors, though not directly involved, are aware of the virtue of military preparedness, and for their information the Medical Library Association has begun to publish a column on military medicine in each issue of its quarterly *Bulletin.* This is not an abstract of current periodicals, such as the Medical Research Council is giving us in its new *Bulletin of War Medicine,* but a survey of publications on military medicine with a commentary. It is designed as a guide for the librarian who caters for the medical public, but it should prove equally valuable to all users of medical libraries. Our own librarians, preoccupied with safeguarding their collections from the dangers of air-raids, will probably read as a counsel of perfection the association's advice that "every library should set aside a section of its main reading-room for military medicine, where the doctor should find books old and new, publications from World War I, current military journals, reference lists of important advances in military medicine, in the care of civilians under war conditions, aviation medicine, gas warfare . . ." and so on. The Association leads the way by printing a list of thirty-three current periodicals of military medicine. Half of these, however, come from enemy or occupied countries and must be almost as difficult to obtain in America as here. The Association also describes the steps being taken by the National Research Council in Washington to collect all relevant material for compiling the medical history of the present world upset as it affects America. We may hope that here in the centre of the battle someone has had the foresight to begin a similar collection.—*The Lancet,* 1941, **1**: 20.

Army Footwear

That the famed marching ability of the German infantry is due not only to the physique of the men and their training, but also to the relative efficiency of their footwear, which combines comfort with protection and freedom of action to the leg, is a fact stated by Dr. K. Vernon Bailey, M.C., in the *Journal of the Royal Army Medical Corps.* When pointing out that

much has been written about the mechanization of the army, he recalls that marches of over 30 miles a day were made by the highly mechanized German forces in the Polish campaign, and suggests that the ability of British infantry to make forced marches may be put to the test in this war.

Dr. Bailey maintains that army footwear should not constrict the leg and it should afford protection against damp and cold. He points out that in spite of mechanization and permanent fortifications British infantry will have to encounter mud during the forthcoming winter and that the "battle" dress with gaiter or short puttee will afford even less protection than the full puttee which kept a certain amount of damp out for a short time but which caused varicose veins, rheumatism, and "trench foot" when it became soaked and could not be removed and dried. To those with experience of the Ypres salient the losses from these causes were as devastating and dangerous to the morale as those produced directly by the enemy. The "battle" dress with gaiter or puttee will afford even less protection. The lower end of the trousers will become caked with mud which will infiltrate through the top of the boot to the foot inside.

Dr. Bailey suggests it is essential that the foot and leg of the infantryman be uniformly protected as far as possible from damp and cold, and that there should be no constriction of the leg itself. He regards the gaiter as not being sufficiently a part of the boot at the instep and as not covering the leg to a sufficient height, and he has devised a modified army boot which he describes as comfortable, weatherproof, and capable of being made waterproof by the application of dubbin or oil.—From the *Journal of the Royal Institute of Public Health and Hygiene.*

"Shelter Legs"

According to *The Lancet,* people suffering from swollen legs began to appear in doctors' consulting rooms within a few weeks of the bombardment of London. Elderly women seem to be most commonly affected, but cases also occur in men and young people. The use of deck chairs in shelters is suspected as a likely cause of the trouble because the wooden cross bar causes pressure on the back of the thighs or on the popliteal vessels, and because the same condition has been noted after long sea voyages when much time has been spent in deck chairs, and also after flying home from Cape Town, the aeroplane seats being rather low and of a similar pattern to a deck chair. It is suggested that the only way to prevent "shelter legs" is for people, particularly if they are elderly or obese, not to sit all night as well as during the day, but to make a point of getting their feet up for several hours out of the twenty-four.—*J. Roy. Inst. of Pub. Health & Hygiene,* 1941, **4**: 3.

War Literature

THE BRITISH MEDICAL JOURNAL

Blast Injuries (annotation), 1941, **1**: 89.
Wartime Medicine in the U.S.A. (annotation), 1941, **1**: 90.
Problems of Blast Injuries, (report of Society), 1941, **1**: 94.
War Strain in Evacuated Children, Miss A. T. Alcock, 1941, **1**: 124.
War Strain in Evacuated Children (leading article), 1941, **1**: 128.
Active Immunization: Some Present-day Problems (Rep. of Societies), 1941, **1**: 130.
Lice and Disease (leading article), 1941, **1**: 199.

GUY'S HOSPITAL GAZETTE

Ophthalmic Injuries in Warfare, Frank W. Law, 1941, **55**: 15.

JOURNAL OF AVIATION MEDICINE

Medical and Sanitary Care of the Civilian Population Necessitated by Attacks from Hostile Air Craft, G. E. Ledfors, 1940, **11**: 143.
Effects of Anoxia in High Altitude Flights on the Electrocardiogram, M. S. White, 1940, **11**: 166.
Military Aviation Medicine as related to National Defence, D. N. W. Grant, 1940, **11**: 197.
Evaluation of Aptitude for Flight Training, R. B. Bigelow, 1940, **11**: 202.

JOURNAL OF THE ROYAL ARMY MEDICAL CORPS

Gunshot Wounds of the Head in 1940, Hugh Cairns, 1941, **76**: 12.

JOURNAL OF THE ROYAL SANITARY INSTITUTE

Food Poisoning, W. M. N. Mason, 1941, **61**: 69.

THE LANCET

Dressing of War Wounds with Tulle Gras, D. N. Matthews, 1941, **1**: 43.
The Control of the Bed Bug, J. R. Busvine, 1941, **1**: 55.

THE MILITARY SURGEON

Nutrition and National Defence, M. L. Drazin, 1941, **88**: 39.
Prevention and Treatment of Shock in the Combat Zone, D. B. Kendrick, Jr., 1941, **88**: 97.
Discussion of above, J. A. Mattison, 1941, **88**: 114.

BOOKS AND PAMPHLETS

Nutrition and the War, Geoffrey Bourne, Cambridge University Press, London, 1940, price 3/6.

A Chant of Love for England

The following poem has a singular appropriateness and appeal at the present time. It is by Helen Gray Cone, formerly Professor of English in Hunter College, New York, and was intended as a reply to Lissauer's "Hymn of Hate". It was first published in *The Atlantic Monthly* for February, 1915, and may be found in Volume I of "War Treasury" (Houghton, Mifflin Co.) and Cone's "Harvest Home" (G. P. Putnam's Sons, N.Y.). Professor Cone died in 1934.

A CHANT OF LOVE FOR ENGLAND

By Helen Gray Cone

A song of hate is a song of hell.
Some there be that sing it well.
Let them sing it, loud and long,
We lift our hearts in a loftier song.
We lift our hearts to heaven above,
Singing the glory of her we love . . .
England!
Glory of thought and glory of deed,
Glory of Hampden and Runnymede;
Glory of ships that sought far goals,
Glory of swords and glory of souls!
Glory of songs mounting as birds,
Glory immortal of magical words;
Glory of Milton, glory of Nelson,
Tragical glory of Gordon and Scott;
Glory of Shelley, glory of Sidney,
Glory transcendent that perishes not.
Hers is the story, hers be the glory . . .
England!
Shatter her beauteous breast ye may,
The Spirit of England none can slay!
Dash the bomb on the dome of Paul's,
Deem ye the fame of the Admiral falls?
Pry the stone from the chancel floor . . .
Dream ye that Shakespeare shall live no more?
Where is the giant shot that kills
Wordsworth walking the old green hills?
Trample the red rose on the ground . . .
Keats is beauty while earth spins round!
Bind her, grind her, burn her with fire,
Cast her ashes into the sea . . .
She shall escape, she shall aspire,
She shall rise to make men free;
She shall rise in a sacred scorn,
Lighting the lives that are yet unborn;
Spirit supernal, splendor eternal . . .
England!

Medical Societies

The Clinical Surgical Society of Western Canada

At a meeting of representative surgeons from the three Prairie Provinces, held at the Winnipeg General Hospital on February 7th and 8th, an organization was formed and given the official title of The Clinical Surgical Society of Western Canada. Officers elected to appointments were: *President*—Dr. O. S. Waugh, Winnipeg; *Secretary-treasurer*—Dr. M. R. MacCharles, Winnipeg. Elected Provincial representatives were: Alberta—Dr. A. R. Munroe, Edmonton; Saskatchewan—Dr. E. B. Alport, Regina; Manitoba—Dr. C. W. Burns, Winnipeg. About twenty surgeons were present. Clinics were given, papers on assigned subjects were read, and discussions on clinical matters took place. The group decided that the next meeting would be held in Winnipeg in 1942 and thereafter in the other provinces in definite rotation.

ROSS MITCHELL

The Saint John Medical Society

The monthly meeting of the Saint John Medical Society was held in the Admiral Beatty Hotel on Febuary 25, 1941. The special speaker for the evening was Dr. J. R. Nugent. He reviewed the subject of empyema with particular reference to the bacteriological causation, the optimum time for operation, and the type of drainage required in a variety of cases. The discussion was most opportune as there has been a slight increase in the incidence of empyema following influenza and measles. Discussion was general and on the whole very constructive.

Société médicale des hôpitaux universitaires de Québec

Une séance de la société eut lieu à la Clinique Roy-Rousseau, Mastaï, près Québec, le 7 février 1941. Suivent les résumés des travaux.

ASPECT MÉDICAL DU MONGOLISME.—J. C. Miller.

L'auteur préfère mongolisme à idiotie mongolienne des anciens traités, parce que l'affection n'implique pas souvent l'amentia véritable, et aussi parce que le traitement médico-pédagogique peut déterminer des améliorations très sensibles.

Dans une étude élaborée sur quarante-cinq observation personnelles, l'auteur discute l'étiologie, la pathogénie, le diagnostic et le traitement du mongolisme; il suggère aux médecins-praticiens et aux pédiâtres d'amorcer un traitement précoce chez le tout jeune enfant; la précocité et la persévérance du traitement lui paraissent en effet être les grandes conditions du succès dans l'assistance à cette variété d'anomalie congénitale.

INSUFFISANCE SURRÉNALE AIGUË CHEZ UN MALADE PRÉSENTANT UNE TUBERCULOSE BILATÉRALE DES CAPSULES SURRÉNALES.–Mathieu Samson et Sylvio Caron.

Un jeune homme de 23 ans, d'une bonne santé apparente, à la suite d'excès alcooliques, devient subitement agité, délirant; il se présente comme un intoxiqué. Quelques heures après il tombe dans le coma et meurt. Une autopsie révèle la présence d'une tuberculose fibro-caséeuse bilatérale des capsules surrénales, sans que l'on constate de lésions tuberculeuses évolutives au niveau d'autres organes.

Les auteurs concluent à la nécessité des autopsies pour établir les causes véritables de la mort, surtout dans les cas de mort suspecte.

RAPPORT STATISTIQUE SUR LA THÉRAPEUTIQUE PAR LE MÉTRAZOL DEPUIS 2½ ANS À L'HÔPITAL ST-MICHEL-ARCHANGE DE QUÉBEC.—Lucien LaRue et L. Patry.

	Guéris	*Améliorés*	*Stat.*	*Libérés*	*Total*	*Décédés*
Rapport général de l'an dernier. Total....255	82 32.1%	104 40.9%	69 27%	153 60%	186 73%	0
Hommes traités en 1940..... 77	38 50%	23 31%	16 19%	56 72%	61 80%	0
Femmes traitées en 1940..... 120	54 45%	40 33%	26 22%	80 67%	94 78%	0
Grand total..... 452	174 38%	167 36.7%	111 24.5%	289 64%	341 75.4%	0

La thérapeutique par le métrazol continue à donner des résultats très encourageants. L'expérience acquise depuis deux ans et demi par ce traitement nous permet de conclure qu'il est un mode de traitement actif, facile, sans danger sérieux, s'il est fait en milieu spécialisé. Il s'applique à une grande catégorie de maladies mentales en autant qu'elles sont récentes, parfois il donne des résultats inespérés. La psychothérapie au cours et après le traitement nous parait être de grande utilité.

L'accident toujours à craindre demeure la fracture de la colonne par écrasement du corps vertébral. L'anxiété qui précède l'injection est l'objet d'études spéciales actuellement, et nous espérons pouvoir bientôt obvier à cet inconvénient. Cette thérapeutique est appelée à donner des résultats également dans les cas d'alcoolisme aigü avec côma, ou encore avec agitation intense.

L'ANXIÉTÉ ET LE MÉTRAZOL.—Sylvio Caron et Charles-A. Martin.

Les médicaments qui, administrés à dose inusitée, engendrent des représentations mentales étranges et excitent anormalement le système vago-sympathetique, produisent par là de l'anxiété et de l'angoisse. Le métrazol donné à dose convulsivante et surtout à dose subconvulsivante réalise ces conditions. Une description est faite des sensations éprouvées et des réactions anxieuses qui en découlent, au moment de l'injection et dans les intervalles du traitement. Ces réactions anxieuses sont représentées comme la complication principale du traitement parce que préjudiciables au patient, gênantes pour le personnel médical, nuisibles à l'application judicieuse et effective de la méthode. De plus l'anxiété semble augmenter la résistance au métrazol et ne permet pas toujours de protéger la colonne vertébrale.

Une discussion est faite de la prétendue vertu thérapeutique de la peur, qui est niée par plusieurs auteurs américains qui se sont intéressés a la question; par le fait que le métrazol peut guérir des anxieux à condition qu'ils fassent des convulsions et que les convulsions produites par l'électricité sans réaction anxieuse, suivant la méthode de Cerlatti et Bini, se sont montrées aussi effectives que la thérapeutique par le métrazol.

Parmi les diverses thérapeutiques proposées pour éliminer l'aura anxieuse la scopolamine, employée seule ou associée à la morphine, s'est montrée tres efficace dans la correction du probleme de l'anxiété sans nuire à l'action convulsivante du métrazol, qu'elle semble au contraire faciliter. Un tableau est fait de l'amélioration des conditions du traitement après prémédication par le H.M.C. employé routinièrement depuis un an.

RICHARD LESSARD,
Secrétaire.

The Winnipeg Medical Society

Prof. J. S. McCartney, University of Minnesota, addressed the Winnipeg Medical Society, March 6th, on Thrombosis and Embolism. Dr. Digby Wheeler, President of the Society, was in the chair. Professor McCartney said that one hundred years ago Virchow had laid down the concept of pulmonary embolism as a detached thrombus being carried by the circulation along a pulmonary artery, usually the right, until it became arrested. This concept was challenged, but Virchow proved its correctness by experiments in which he introduced various foreign bodies into the veins of animals and recovered them in the lungs. At first only medical causes, *e.g.*, typhoid, were concerned in the formation of thrombi but after 1846 laparotomies produced thrombosis. The exact cause of death from pulmonary embolism had not yet been determined. Emboli sometimes come in showers. The possible sources of emboli can be established by present day methods of autopsy only in about two out of three cases. Were complete dissection permitted the primary site might be found in almost all instances.

In the development of a thrombus these various factors must be considered: slowing of circulation from cardiac conditions or splinting of the abdomen and relative inactivity; damage to endothelium from injury, or bacterial infection; changes in the composition of the blood, obesity, inactivity of age, loss of muscular tone, infection.

In statistical reports, time of life and the site of operation have not been correlated. Removal of large masses of tissues in abdominal operations is particularly harmful.

Professor McCartney praised the work of Professor Best with heparin but he considered the cost relatively high. The incidence of embolism at the Mayo Clinic was less than 1 per cent.

A vote of thanks was moved by Professor D. Nicholson.

Abstracts from Current Literature

Medicine

The Use of Exercise Tests in Connection with Venous Pressure Measurements for the Detection of Venous Obstruction in the Upper and Lower Extremities. Veal, J. R. and Hussey, H. H.: *Am. Heart J.*, 1940, **20**: 308.

Measurement of the pressure in the peripheral veins is generally recognized as a diagnostic procedure of substantial value in a variety of diseases. The authors point out that an elevated pressure in the antecubital veins is sometimes the only means of detecting with certainty the presence of heart failure, and, in obvious cases, of gauging the severity and following its progress. It is similarly useful in cases of acute and chronic cardiac compression. Comparisons of the pressures in the veins of the four extremities are helpful in the localization and diagnosis of arteriovenous fistula and of diseases causing partial or complete occlusion of one of the venæ cavæ or their branches. Venous pressure measurements are useful in the diagnosis of mediastinal lesions (especially mediastinal tumour), pleural and pulmonary diseases which alter the intrapleural pressure, intra-abdominal tumour, cirrhosis of the liver, ascites and localized obstruction of the peripheral veins. It is impossible, however, in some cases, to detect the presence of localized venous obstruction in the upper and lower extremities by measuring the basal venous pressure.

The authors illustrate the comparative effects of "exercise tests" upon the venous pressures

of normal persons, patients with heart failure, and patients with localized venous obstruction, and emphasize their value in demonstrating the presence of the latter. They outline a simple method of measuring the "general" and "local" venous pressures, requiring a 19-gauge needle and a 2 c.c. syringe with a side-arm to which a calibrated glass measuring tube of 4 mm. bore is connected by means of suitable rubber tubing. W. H. HATFIELD

Sickle-cell Diseases. Bauer, J.: *Arch. Surg.*, 1940, **41**: 1344.

Sickle-cell anæmia was originally described by Herrick in 1910. Bauer places on record additional data derived from personally studied material, as well as additional conclusions, chiefly therapeutic, derived from these data and from data recorded in the literature.

He observes that sickle-cell anæmia is not infrequently entirely overlooked by the clinician and is discovered only by the pathologist at autopsy. The diagnosis is established by the presence of a small, markedly atrophied spleen, which consists of a mass of partially calcified fibrotic tissue. Errors of diagnosis are not infrequent. The enlarged heart, systolic murmur, and accentuated second pulmonary sound observed in the patient with sickle-cell anæmia, may lead to an incorrect diagnosis of rheumatic mitral lesion. This type of anæmia may account for hypertrophy of the right side of the heart without a valvular lesion. It may be the underlying cause of ulcers of the leg. It may give rise to pains presumably of rheumatic origin in the muscles, bones, and joints. It may also cause so-called abdominal crises which may be diagnosed as acute appendicitis or perforated peptic ulcer.

Patients with sickle-cell anæmia are poor medical and surgical risks. They may succumb to relatively simple disease as acute catarrhal colitis or from appendicectomy or hernioplasty. Clearly established are certain facts concerning the sickling phenomenon. This is dependent solely on the red blood cells.

It does not depend on any peculiarity of the plasma. It is readily demonstrated by a simple laboratory technique. That sickle-cell anæmia is hæmolytic (produced by an exaggerated destruction of red blood cells) is capable of clinical and anatomical proof.

The author discusses at length the pathogenesis of sickle-cell anæmia, clinical signs and symptoms, relation of sickling and sickle-cell disease and therapeutic considerations.

G. E. LEARMONTH

Surgery

General Abdominal Lymphadenopathy. Wilensky, A. O.: *Arch. Surg.*, 1941, **42**: 71.

It is recognized that there exists in children and young adolescents, an acute abdominal condition of moderate or severe grade similar in its general manifestations to appendicitis, diverticulitis, etc., but in which the predominant discoverable observations at operation, consist only of an inflammatory enlargement of the mesenteric and retroperitoneal lymph glands, in the ileocæcal angle.

The patient is usually between three and eighteen years of age. The symptoms of an acute attack are as follows. The patient is seized with abdominal pain of varying severity which can be traced to the right side of the lower part of the abdomen, occasionally extending to the left side. The symptoms are less acute than those of appendicitis or of some other acute intra-abdominal conditions. In the absence of complications there is no boardlike hardness of the abdominal muscles, no Blümberg pain, no Rovsing symptom, no resistance, and no vomiting; there remains only the pain to deep palpation centring about the umbilicus or in the right iliac fossa. Where there is more serious involvement there is evidence of a definite general toxic reaction as shown by a high temperature and a high leucocyte count (20,000 per c/m.) in contrast to the relatively insignificant local symptoms. The inflamed mesenteric gland presents all kinds of non-specific inflammation. The fact that the mesenteric lymphadenitis is always secondary and presents itself with its clinical symptoms as a complete independent picture in which, sometimes the source of infection is veiled or at other times difficult or impossible to locate.

Mesenteric lymphadenitis is thus frequently the first concrete revelation of an intra-abdominal inflammation in a form simulating a mild or symptomless appendicitis, typhlitis or enteritis. The attacks subside as a rule. Seldom can bacteria be demonstrated in the glands and the predominating organism is some strain of streptococcus or occasionally the *Br. melitensis*. Abdominal exploratory operations are more or less frequently necessary in order to establish the true nature of the intra-abdominal condition. G. E. LEARMONTH

A Rôle for Surgeons in the Problem of Essential Hypertension. Heinbecker, P.: *Ann. Surg.*, 1940, **6**: 1101.

Les résultats éloignés de la splanchnectomie dans l'hypertension artérielle permet à l'auteur de préciser la valeur de la chirurgie dans ces cas, d'autant mieux que la thérapeutique médicale n'a pas fourni jusqu'à présent de résultats satisfaisants. L'auteur énumère et commente les facteurs qui influencent la pression artérielle normale, dont trois principaux: rôle du système nerveux, rôle des glandes endocrines, et rôle des reins.

Suit un long chapitre sur la pression sanguine dans l'hypertension artérielle où l'auteur développe les idées suivantes: l'état des artères, dans l'hypertension artérielle; les facteurs d'origine nerveuse dans l'hypertension essentielle;

les facteurs endocriniens; le facteur rénal; la fonction synergique d'une substance rénale et de l'adrénaline; les preuves expérimentales; l'effet de l'adrénaline et de l'énervation de la surrénale sur le système nerveux; les résultats cliniques après splanchnectomie. L'auteur relate ensuite 4 observations personnelles d'hypertendus splanchnectomisés bi-latéralement en 1938. Trois opérés restent améliorés 2 ans plus tard; un n'est pas amélioré de son hypertension mais est soulagé des symptômes concommittants. L'un des quatre mourut 2 ans après d'hémorragie cérébrale.

Considérant ces 4 résultats personnels et les symptômes cliniques de ces malades, la splanchnectomie peut donc améliorer l'hypertension lorsque les facteurs nerveux sont surtout en cause au début des troubles, ce que l'on serait porté à croire lorsque la pression systolique et diastolique reviennent à la normale à la suite du repos et de la médication sédative. La splanchnectomie n'influencera pas l'hypertension artérielle notablement, s'il y a ischémie rénale indépendante de l'influence nerveuse; mais l'hypertension artérielle de cause nerveuse, sera influencée favorablement par la résection splanchnique dans environ 70 pour cent des cas, et ces résultats seraient la conséquence de l'énervation des surrénales.

Toutefois, vu le petit nombre de cas longuement observés, on ne peut encore compter à coup sûr, sur une guérison définitive par la splanchnectomie.

D'après l'auteur ce problème chirurgical consiste à déterminer les cas ou l'énervation rénosurrénalienne pratiquée au début de l'hypertension artérielle la fera choir à la normale, tout en provoquant une circulation rénale idoine. On connaitrait ainsi le rôle initial du système nerveux dans la genèse de la maladie, de même que les autres facteurs à incriminer. Alors seulement on saurait pertinemment quels sont les cas relevant de la splanchnectomie.

PIERRE SMITH

Re-establishment of the Gastro-intestinal Passage after Gastric Resection. Polya, E.: *Surg., Gyn. & Obst.*, 1940, **70**: 270.

Ce travail est un exposé de l'historique, de la genèse, d'une terminologie revisée, des avantages et inconvénients, et des difficultés techniques des différents procédés de rétablissement du conduit gastro-intestinal après résection gastrique, surtout de la gastro-duodénostomie préconisée par l'auteur.

Pour le rétablissement du conduit gastro-intestinal la technique n'est pas tout. L'essentiel est la sécurité post-opératoire et le bien-être permanent de l'opéré. Il faut savoir les différentes méthodes pour choisir la meilleure dans chaque cas particulier ou exceptionnel.

L'auteur énumère les points essentiels des méthodes employées pour le rétablissement de la continuité gastro-intestinale. Ces points sont à la base de la terminologie adéquate et nécessaire proposée par l'auteur, puisque 37 procédés différents peuvent être utilisés pour refaire le transit gastro-intestinal après résection gastrique sans compter les 12 procédés d'anastomoses complémentaires en Y.

La résection gastrique doit comprendre la résection partielle de l'estomac, avec le pylore et l'antre ou au moins de toute la muqueuse du pylore et de l'antre. Pour réaliser le rétrécissement et l'allongement combinés du bout gastrique restant il existe plusieurs procédés, motivés pour des raisons diverses. Le choix du meilleur procédé est difficile et implique la connaissance des dangers et des avantages de chaque procédé. Les dangers viennent de 3 facteurs que l'auteur commente en indiquant les moyens d'y remédier. Ces dangers sont: (1) les dimensions différentes des sections à coapter; (2) la traction anormale des tranches suturées; (3) les changements qui se produisent dans le passage du contenu gastrique après l'opération. Avantages: 2 principaux; la facilité opératoire et la fonction gastrique après chaque variété d'opération.

La facilité opératoire est en rapport avec la possibilité d'opérer en dehors de l'abdomen; d'où aseptie plus complète, meilleur contrôle des sutures, temps abrégé, moins de collapsus, de pneumonie ou autres complications. A cet égard la gastro-jéjunostomie est préférable à la gastro-duodénostomie. Mais la gastro-duodénostomie après gastrectomie, se rapproche le plus du fonctionnement physiologique normal et cause moins de troubles et de complications tardives que la gastro-jéjunostomie qui, elle, est plus facile et moins dangereuse.

Au nombre des difficultés techniques la principale est dûe à la fixité du duodénum. L'auteur préconise la résection gastrique tubulée ou conique qui facilite la suture gastro-duodénale termino-terminale quand l'état du duodénum le permet. Sinon l'auteur préfère l'anastomose gastro-jéjunale termino-latérale partielle inférieure rétro-colique. Parfois le choix ne s'impose qu'à ventre ouvert. L'auteur explique ensuite les avantages et des au nombre inconvénients éventuels de l'anastomose gastro-jéjunale termino-latérale rétrocolique, cite la constriction du moignon gastrique. Si on pratique la section gastrique oblique de gauche à droite et de haut en bas on enlève une plus grande étendue de la petite que de la grande courbure, ce qui est recommandable aussi bien pour le cancer que pour l'ulcère, vu que la lésion est plus étendue sur la petite courbure. D'autres points essentiels et de détails de technique sont expliqués par l'auteur de même que les avantages et les inconvénients de la gastro-duodénostomie termino-latérale, de la gastro-duodénostomie termino-terminale, de la gastro-jéjunostomie termino-latérale et de la gastro-jéjunostomie termino-latérale pré-colique.

PIERRE SMITH

Obstetrics and Gynæcology

The Nausea and Vomiting of Pregnancy due to Allergic Reaction. Finch, J. W.: *Am. J. Obst. & Gyn.*, 1940, **40**: 1029.

The nausea and vomiting accompanying pregnancy are due to an allergic reaction of the patient to the secretion of her own corpus luteum of pregnancy. The luteal hormone acting as an allergen is not progesterone, but is an unidentified hormone of the corpus luteum. Desensitization may be accomplished by injection of graduated doses of the hormone of the corpus luteum in oil, thus alleviating or stopping the patient's symptoms. Intradermal testing may determine, even before pregnancy, whether a patient will or will not be nauseated when pregnant by determining whether or not she is sensitive to her own secretion.

ROSS MITCHELL

The Rôle of Deep Cauterization in the Prevention of Cancer of the Cervix. Cashman, B. Z.: *Am. J. Obst. & Gyn.*, 1941, **41**: 216.

Chronic cervicitis seems to be a contributing factor in the causation of carcinoma of the cervix. Cancer of the cervix is insidious in onset and because of the late stages in which it is seen today, prevention of cervicitis, prevention of cancer by adequate treatment of existing cervicitis, and early diagnosis by periodic examination of women over twenty-five years of age offer the best solution of the problem. In order to destroy infection in the cervix by cauterization it is often necessary to cauterize deeply and extensively. Careful post-operative care is necessary to prevent stenosis of the cervical canal after deep cauterization. Deep cauterization of the cervix has been an effective method of preventing cancer in a series of 10,000 cases, for only two cases of cancer of the cervix are known to have occurred in this series. ROSS MITCHELL

Tubo-uterine Implantation Followed by Successful Pregnancy. Hayes, S.: *J. Obst. & Gyn. Brit. Emp.*, 1940, **47**: 563.

A quartipara, aged 25 years, had been sterilized 4 years previously by section and ligature of the Fallopian tubes at the uterine ends. In December, 1937, implantation of the Fallopian tubes was performed, the technique of Bonney, slightly modified, being followed.

Two pieces of silkworm gut were threaded through the eye of a long probe and passed into the uterus. The cervix was clamped to prevent the probe slipping. The distal ends of silkworm gut were sutured to the vulva. The tubes were then about 1 inch shorter than normal. The uterus was incised transversely across the fundus until the uterine cavity was freely exposed and the lateral incisions were extended to the points where the interstitial portions of the Fallopian tubes should normally be. The uterine ends of the tubes were split for ¼ inch and a 0000 catgut suture passed through one lip only. This lip was then sutured to the uterus at the site which ensured that the tubes were lying in their normal positions. The uterus was closed with interrupted No. 1 catgut sutures, great care being taken that the tubes were not compressed. No clamps of any kind were used and hæmorrhage was negligible. Convalescence was uneventful. The two pieces of silkworm gut were withdrawn on the 8th day.

On February 1, 1938, inflation of the Fallopian tubes showed that both were patent. Hystero-salpingography confirmed this finding. One month later conception occurred, but ended in abortion.

On October 10, 1938, both tubes were patent on inflation.

In January, 1939, conception again occurred and a male child weighing 5 pounds 4 ounces was born naturally on October 10, 1939.

P. J. KEARNS

The Cold Pressor Test in Pregnancy. Browne, F. J.: *J. Obst. & Gyn. Brit. Emp.*, 1940, **47**: 365.

The subject is placed in a recumbent position for 15 minutes; with the cuff placed on one arm, the opposite hand is placed in ice water at 4 to 5° C. The blood-pressure is taken at the end of 30 seconds and again at the end of 60 seconds. The hand is then removed from the bath and readings are taken every 2 minutes till the blood-pressure returns to its previous base level. The highest reading is recorded as a measure of the response. Normally the pressure returns to normal in 2 minutes after the hand is removed from the ice water.

The paper records the results of the cold pressor test in a series of 52 normal primagravidæ. The tests were undertaken in order to assess their value in picking out patients who might later develop pre-eclamptic toxæmia.

The peak of systolic pressure reached during the test seems to be of value in this respect. If the peak is over 150 mm. Hg. the patient is very likely, though not certain, to develop toxæmia later. A high range, *i.e.*, the difference between the basal level and the peak did not seem to be of any value. The same applies to the time taken to return to the normal basal level. A high basal blood-pressure seems to be of value as an indication that toxæmia will develop later.

An early rise of blood-pressure, *i.e.*, a systolic rise of 130 mm. Hg. or over at the first prenatal examination, is a useful and easily observed indication of an instability of blood-pressure of perhaps of a high basic level that is often a forerunner of pre-eclamptic toxæmia. In the present series it was as useful an indication as a high peak. P. J. KEARNS

Oto-rhino-laryngology

New Tests and Clinical Experiments on Hearing. Kobrak, F. W.: *J. Laryn. & Otol.*, 1940, **55**: 405.

This paper is an analysis of some hearing tests used in diagnosis. A new tuning fork test is described. Using Struycken's tuning forks, which are calibrated according to the periods of hearing sensation, a series test is performed. The tuning fork is held to the ear until it ceases to be heard. This is timed and is called the primary period of hearing sensation. Then the fork is struck again and after a period of time equal to the primary period is brought to the ear until it ceases to be heard. This is called the secondary period. The procedure is repeated, the fork being brought to the ear after a time equal to the combined primary and secondary periods. This process is continued until the fork ceases to be heard and the last figure is called the final threshold. The times thus obtained are plotted as a graph and the author gives 90/20/0 in seconds as being normal for a c′ fork. He believes that a long reading for the final threshold points to a middle ear or cochlear lesion, while a penultimate prolongation points to an active process in the sensory nerve itself.

An audiometer test to eliminate the present wide variations found in normal cases is suggested. A reading is taken when the patient first hears the tone as its intensity increases and a second reading when the patient fails to hear the tone as it is decreased. The double set of readings is plotted and the author believes that broad bands are produced by a middle-ear factor.

As a result of findings with these tests the author believes that for deciding on a suitable hearing aid a short audiometer test is sufficient, and for routine diagnosis a short test with reliable tuning forks is sufficient. The bone conduction audiogram is analyzed in detail, with a discussion of the relations of the action of the intrinsic aural muscles in hearing.

GUY H. FISK

Radiology and Physiotherapy

The Utility of Fluorography. Hirsch, I. S.: *Radiology*, 1941, **36**: 1.

Fluorography is photography of the x-ray image on a fluoroscope. The author discusses the points required of an efficient lens and states that he uses a commercial 35-mm. film camera equipped with an F 1.5 lens. A slower lens is not suited for this work and there is no faster lens ordinarily available which will cover this field.

The difficulties in controlling the lag of the fluorescent screen along with some experimental work on different types of screen are discussed. In general, the screens utilized today are those which fluoresce blue and those which glow with a green light. In the former type the material used is an artificially crystallized zinc sulphide compound, while in the latter complex salts of heavy metals are utilized. A Patterson "B" screen and one of the zinc sulphide (fluorazure type) have both been used. The latter is most efficient though it has a certain amount of lag.

The apparatus consists essentially of a light-proof box of pyramidal shape with a fluoroscopic screen mounted at one end, a camera at the other, and means for adjusting the height of the apparatus. The camera is mounted at a distance of 90 cm. from the screen. The x-ray exposure required is about twelve times that used with the regular double-coated x-ray film and double high speed intensifying screens. For the average postero-anterior view of the chest 88 kv.p., 150 ma., and 1/10 second exposure at 80 cm. tube-screen distance is necessary.

Its value as a diagnostic agent for large numbers of x-rays of chests for tuberculosis and other diseases is conceded, and the low cost makes it possible to use this method in doing chest surveys of great numbers of the population.

R. C. BURR

Roentgen Irradiation in the Treatment of Inflammations. Pendergrass, E. P. and Hodes, P. J.: *Am. J. Roentgenol. & Radium Therapy*, 1941, **45**: 74.

The value of irradiation in the treatment of inflammations has been well recognized by radiologists for years. The majority of other physicians, however, remain to be convinced of its therapeutic benefits. This healthy skepticism has been due largely to several factors: (1) A lack of well controlled experimental evidence supporting the value of irradiation; (2) the use of other therapeutic procedures in conjunction with irradiation which has prevented adequate analyses of the results attributed to irradiation; and (3) the concern with which doctors view therapeutic measures reported efficacious in a variety of conditions. Recent investigations have helped considerably to satisfy valid criticisms concerning the need for reliable experimental data. The second and third factors can be answered only by carefully evaluating one's personal experience and the data published by others.

The present communication is an attempt to analyze the results obtained in 527 patients treated for infections in the Department of Radiology of the Hospital of the University of Pennsylvania. Not all forms of inflammations have been treated by the authors; therefore, they have concerned themselves only with those inflammatory conditions with which they have had personal experience (bursitis, carbuncle, cellulitis, draining ears, erysipelas, erysipeloid, furuncle, gas gangrene, granuloma telangiectaticum, herpes simplex, parotitis, pneumonia, sinusitis, and verruca vulgaris).

The authors discuss the mechanism involved in irradiation of inflammations under: (*a*) Effect upon bacteria. (*b*) Effect upon normal cellular response to tissue irritants. (*c*) Effect upon normal immunological responses. (*d*) Effect upon vascular system.

The physical factors of techniques employed are outlined. Then follows a detailed discussion of diagnosis and treatment of bursitis, carbuncle, cellulitis and lymphangitis, temporal bone disease, erysipelas, erysipeloid, furuncle, gas gangrene, granuloma pyogenicum, herpes simplex, parotitis, pneumonia, sinusitis and verrucæ. R. C. BURR

Anæsthesia

Combined Intravenous-spinal Anæsthesia. Kees, P. A.: *Current Researches in Anæs. & Anal.*, 1941, **20**: 24.

The author has used novocain spinal anæsthesia combined with intravenous evipal or pentothal sodium, as the latter have very little effect upon the blood pressure. Evipal is favoured over pentothal as it is less depressing to respiration.

The use of intravenous anæsthesia in addition to spinal is indicated for premedication, for increasing anæsthetic depth, for quieting an excited patient during anæsthesia, and for prolonging anæsthesia. The solutions used are 10 per cent evipal or 5 per cent pentothal.

With evipal as premedication, the unco-operative patient may be placed in position for lumbar puncture and the spinal anæsthetic administered without his knowledge after a small dose of the 10 per cent evipal (3 to 5 c.c.) intravenously. Supplementary doses of evipal may be necessary after the spinal has been given due to insufficient depth. This may be administered through the intravenous tubing if the patient is already receiving an intravenous infusion of normal saline or 5 per cent glucose in saline. It is injected with a fine hypodermic needle directly into the tubing of the infusion apparatus. Evipal may be given in this way with the 5 per cent glucose in saline, but as pentothal forms a precipitate with glucose it is better given with normal saline solution or with blood transfusion if necessary. Small repeated doses of two to six c.c. are injected slowly until the patient is asleep. Then sleep may be maintained by giving one or two c.c. every ten to fifteen minutes as necessity demands. When a patient becomes excited during spinal anæsthesia he may be quieted by supplementary intravenous anæsthesia. This seldom requires more than one or two c.c. of the barbiturate solution to keep him dozing quietly.

When the operation must be prolonged beyond the limit of the spinal, anæsthesia may be extended with small doses of evipal or pentothal given intermittently. Here, as in the other cases cited, supplementary anæsthesia is for sensation alone. If the time required for operation outlasts the duration of motor relaxation pushing the barbiturate to the stage of relaxation may be dangerous and may cause too great a depression. Small doses of ethyl ether are probably the safest alternative method to obtain additional motor relaxation.

The use of intravenous-spinal anæsthesia is contra-indicated in patients with liver damage, in cases of shock and poor risks. When using combined intravenous and spinal anæsthesia the anæsthetist must be especially alert to any depressive changes in the patient's condition suggestive of overdosage, and treat these promptly as they occur with oxygen and carbon dioxide, and respiratory stimulants such as coramine, metrazol, alpha lobelin or picrotoxin injected intravenously. F. ARTHUR H. WILKINSON

Therapeutics

Further Observations on the Clinical Use of Vitamin K. Weir, J. F. *et al.*: *Am. J. Digest. Dis.*, 1940, **7**: 485.

It is pointed out that the danger of post-operative hypoprothrombinæmia in severe degrees of cholecystic and biliary infection has not been generally appreciated. Hypoprothrombinæmia and the hæmorrhagic diathesis have been demonstrated in other gastro-intestinal conditions. Under the diseases outlined a deficiency diet, loss of essential substances by vomiting and diarrhœa, and an abnormal mucosal surface of the gastrointestinal tract are sufficient to deplete prothrombin. As in some cases of jaundice, the deficiency does not become serious until after some surgical procedure designed to correct the primary condition has been performed. The authors have used four synthetic compounds with excellent results, (1) phthiocol in doses of 25 to 50 mg. intravenously; (2) 1, 4-dihydroxy-2 methyl-3-naphthaldehyde in doses of 10 to 20 mg. intravenously; (3) 2-methyl-1, 4-naphthoquinone orally in doses of 1, 2, 3 and 5 mg. and (4) 2-methyl-1, 4-naphthohydroquinone-sodium sulphonate intravenously in doses equivalent to 2 mg. of 2-methyl-1, 4-naphthoquinone. They have also used vitamin K_5 (4-amino-2-methyl-naphthol hydrochloride) intravenously with effect.

The treatment in other cases was of a prophylactic nature and no manifestations of bleeding were encountered at any time during the period of illness. The action of these compounds is extremely rapid and suggests a possible enzymatic activity. S. R. TOWNSEND

Hæmolysinic Anæmia and Hepatic Degeneration Cured by Splenectomy. Farrar, G. E., Jr., Burnett, W. E. and Steigman, A. J.: *Am. J. M. Sc.*, 1940, **200**: 164.

The authors report the case of a 17 year old boy admitted to the Temple University Hospital because of jaundice and severe anæmia. He gave a history of two previous attacks of fever, leu-

cocytosis, and jaundice. There was no familial history of icterus.

The admission examination revealed moderate jaundice, a severe macrocytic type of anæmia, and an enlarged spleen. Transfusions caused aggravation of his symptoms and a reduction in his erythrocyte level to below the one million level, associated with intensification of the jaundice. Laboratory investigations showed that the blood serum contained hæmolysins not only for his own washed red cells but also for other red cells of donors in the same blood group.

As an emergency measure splenectomy was performed, following which there was a prompt reduction in his fever and general symptoms and a rapid rise in the erythrocyte level. Subsequent tests for hæmolysins were negative, although these were demonstrated in extracts from the excised spleen. Histological sections from the spleen showed marked reticulum hyperplasia, and from the liver, marked fatty degeneration. The patient made a complete recovery.

The authors conclude that the spleen not only was the site of production of hæmolysins causing the profound macrocytic anæmia, but was responsible for the marked hepatic degeneration. They suggest that all cases of atypical acholuric jaundice, particularly the adult acquired type, should be investigated for possible blood hæmolysins. Their discovery is an absolute contraindication to transfusion and calls for prompt surgical removal of the spleen. E. S. MILLS

Pathology and Experimental Medicine

The Relationship of Polyps of the Colon to Carcinoma. Jackman, R. J.: *Proc. Staff Meet. Mayo Clinic,* 1941, **16**: 11.

Il y a des cancers du colon qui ont pour origine des lésions polypoides de la muqueuse intestinale: c'est pourquoi ces proliférations doivent être enlevées. L'auteur rapporte un cas de polypes chez un malade opéré six ans après pour un cancer du recto-sigmoide. Le processus de transformation et le temps requis pour la dégénérescence maligne d'un polype ne sont pas exactement connus. Le polype pédiculé ou le polype sessile est-il plus dangereux: question sans réponse actuellement. Il se peut que la grosseur du polype soit un facteur important, si l'on admet que le gros polype est à un stage plus avancé d'évolution.

La portion terminale de l'intestin étant le siège le plus fréquent de polypose et d'adénocarcinome, n'y aurait-il pas entre les deux, un rapport de cause à effet.

L'histoire des malades porteurs de polypes intestinaux montre qu'ils meurent très fréquemment d'hémorragies ou de cancer colique.

La polypose est une complication fréquente de la colite ulcéreuse, et la fréquence d'apparition du cancer chez des malades porteurs de polypes secondaires à une colite ulcéreuse est frappante. Les études de Bargen de la clinique Mayo ont bien démontré ce point.

Buie et Brust ont attiré l'attention sur le fait suivant: la coexistence fréquente du polype sur un intestin atteint de cancer, au point de le désigner sous le nom de "polype sentinelle".

En présence de ces faits, l'auteur conclut justement sur la nécessité d'enlever toute formation polypoide du rectum et du sigmoide, par l'électro-coagulation. YVES CHAPUT

Hygiene and Public Health

Clinical Aspects of an Epidemic of Human Encephalomyelitis in Saskatchewan in 1938. Gareau, U.: *Canad. Pub. Health J.,* 1941, **32**: 1.

Relation of Equine Encephalomyelitis to the Epidemic of Human Encephalitis in Saskatchewan in 1938. Fulton, J. S.: *Ibid.,* 1941, **32**: 6.

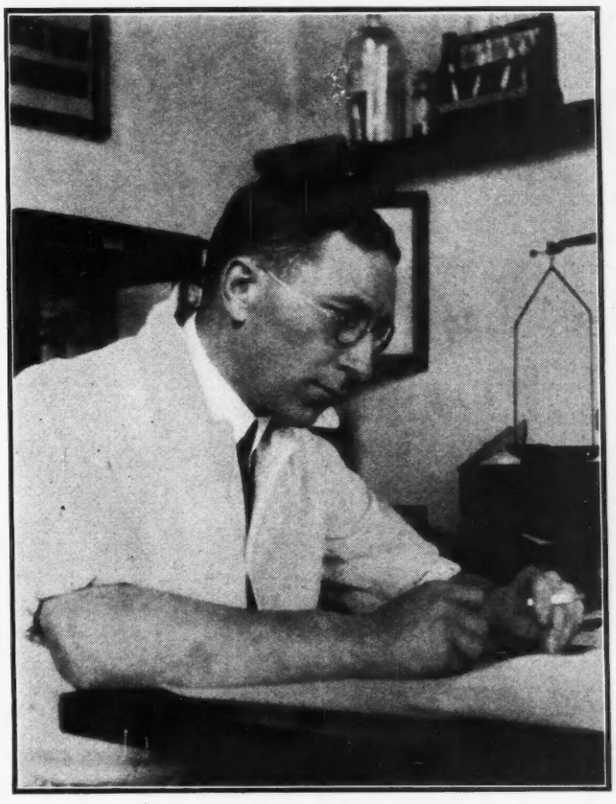
In the summer of 1938 an epidemic of equine encephalomyelitis broke out among the horse population of southern Saskatchewan. Some 15,000 horses are said to have been lost. From July 20th to September 12th of that year 29 cases of encephalomyelitis were reported in approximately the same area among the human population. These cases were characterized by abrupt onset, high temperature, severe headache and general malaise. The spinal fluid was found to be under pressure and to contain a small number of cells usually about 150 and principally lymphocytes. Four of the patients died and of the 25 who recovered 7 had residual symptoms, 2 of which later cleared up. Unfortunately by the time arrangements were made with the laboratory of the University of Saskatchewan for virus examination the epidemic was over and the sera of convalescent patients, which were submitted, were for one reason or another unsatisfactory for antibody titration.

Fulton reviews the literature on the relationship between equine encephalomyelitis and human encephalomyelitis which leaves little doubt that human beings are susceptible both to the eastern and western strains of equine encephalomyelitis. The question as to whether the Saskatchewan cases were actually infected by the equine strain remains unsettled, but the coincidence of the two epidemics is suggestive.

Consideration has been given to the method of transmission of this disease. The seasonal distribution is very much like that of poliomyelitis, that is to say, it is almost entirely limited to the summer months. An insect has been suggested as the vector, possibly the mosquito. At the time of the Saskatchewan outbreak mosquitoes were conspicuously absent. The stable fly, *Stomoxys calcitrans,* was however, particularly prevalent. FRANK G. PEDLEY

Obituaries

Sir Frederick Grant Banting, K.B.E., M.C., M.D., died in Newfoundland on February 21, 1941, as a result of a deplorable aeroplane accident, when on his way to England on a mission for the Canadian Government. It is not too much to say that owing to his brilliant work on insulin his was the most talked of name in medical science throughout the world. Canadian Medicine, and, indeed, Medicine generally, has lost one of its most distinguished figures. This issue contains a number of appreciations of Sir Frederick from some who knew him best. The character of the man can best be learned from these. The *Journal* wishes to be associated with those who have so well expressed our sense of loss. Its regret is genuine and deep.



SIR FREDERICK BANTING

APPRECIATIONS

Sir Frederick Banting will go down in history as one of the world's great medical scientists, as a Nobel prize winner, and as the original mind and driving force behind the discovery of insulin. As Dr. Banting, he will be deeply mourned by thousands, humble and great, who in the most real sense owe their lives to him. His friends will remember Fred Banting as a generous, warm-hearted friend — a vigorous, original, indefatigable worker — a courageous, loyal soldier — and a versatile, modest, entertaining and charming companion.

As a member of the National Research Council for the past five years, Sir Frederick was a tower of strength. To him must go the credit for organizing and directing with outstanding success the Associate Committee on Medical Research. He also took the keenest interest in every phase of science and brought to the Council table not only a fund of information, a fertile and imaginative mind, but an irresistible enthusiasm that swept away difficulties and stimulated activities in all fields. His greatest interest since the outbreak of war lay in the field of aviation, and as Chairman of the Associate Committee on Aviation Medical Research he originated and planned investigations of far-reaching importance and had obtained practical results that have already been acknowledged in Britain and America. When the full effects of such studies are realized it will be apparent that Banting by his tireless energy and grasp of essential factors placed Canada in the forefront of yet another field of medical research.

The world will associate Sir Frederick's greatness with insulin. His friends and associates may well recall his work during the past 18 months with even greater regard, for with characteristic singleness of purpose and determination he threw himself into the fight the day war broke out and his attention never strayed for a moment from the central objective of winning the war. With a complete disregard for personal comfort or safety, he spared himself nothing; he even seemed to court danger and asked no one to do anything involving risk which he did not first do himself. He gave up all the recreations he enjoyed and asked nothing in return. Finally, he has given life itself.

Fred Banting was a big man in every sense of the word. Modest and magnanimous, he never was self-seeking. Fame meant little to him and praise he did not desire. Material things he scorned; wealth he turned away; and never did he capitalize in any way on his discoveries, nor would he leave his native land, although many attractive and highly lucrative offers were made to him. He lived simply, spent little for his personal comfort, but gave freely and secretly to scores whose needs were great.

Although Sir Frederick's chief interest was research, he was prouder of his services in the last war as a front line battalion M.O. than of anything else, and his record there, with a well-earned Military Cross as evidence, justified his pride. He was an unusual composite: an idealist and a practical soldier; a country doctor, a distinguished medical scientist; an artist, but above all an explorer and adventurer in all fields of thought and action. He never lost his youthful curiosity; his mind was always fertile and stimulating. Above all he was a true patriot. He loved his country so well that when the call came in 1939 he put aside his plans for a more leisurely life at pure research, donned the King's uniform and threw all his boundless energy into the struggle. He went on his last mission and to his death out of a stern sense of duty. After a life of simple greatness he died nobly. His memory lives on, an inspiration for those who still may serve.

C. J. MACKENZIE

(Acting President, National Research Council)

CABLEGRAM FROM GEN. McNAUGHTON

London, England,
26 February, 1941.

"We in the Canadian Corps have heard the sad news of Banting's death with the greatest regret which will be even deeper in the hearts of all ranks when they come to know the full significance of the work which he had undertaken on our behalf.

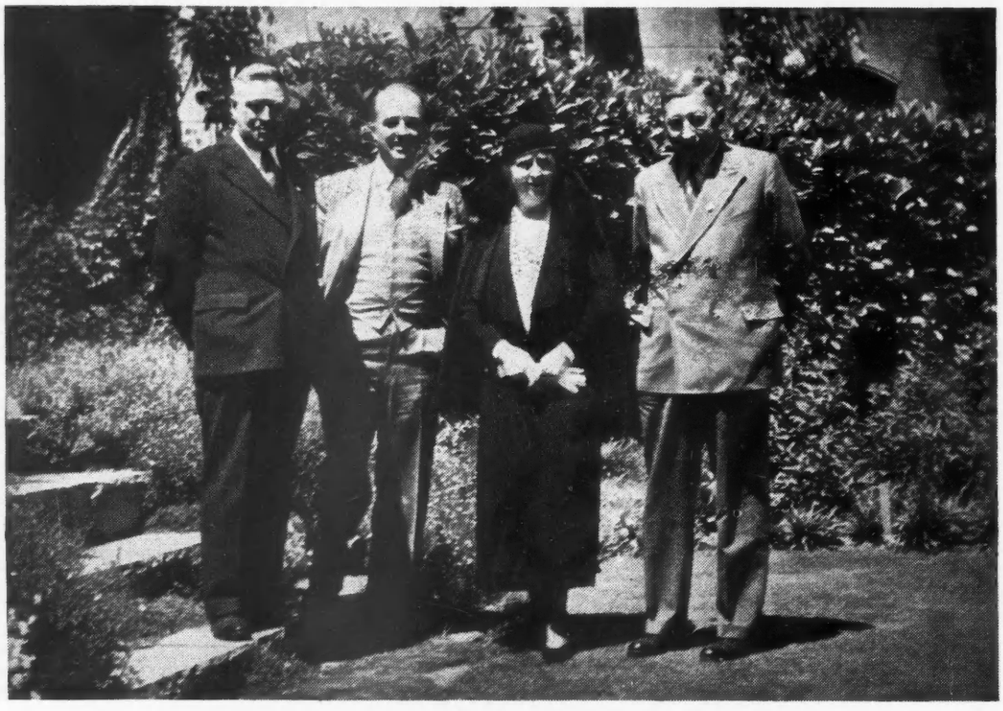
"Five years ago he joined the Council with the prestige of great accomplishment in the relief of the ills of suffering humanity. In all our work he gave of his best,

painstaking help in the administration of the Council's manifold activities, time freely devoted to other sciences as well as medicine, vision and insight and leadership, loyal co-operation and unfailing help and generous encouragement to those who laboured with him in the field of scientific research, modesty almost to a fault. He will be very greatly missed from his place at our council table. When the dark shadow of war overtook Canada and the Empire he came overseas with the desire for service again with the forces in the field but at my personal request he gave this up unselfishly to undertake the organization of research of far-reaching importance to us and which he alone could do. It is in the prosecution of this work that he has given his life. Already we have felt the benefit of his endeavours which will continue to bring comfort to us and confusion to our enemies.''

used fetal tissue which was too old to contain merely islets, and as secretin-exhausted pancreas could not be free from enzymes, the use of acid and alcohol to reduce enzymatic activity must succeed, and did in the first case tried, but it was a struggle to produce active extracts regularly from beef pancreas. This step-like progress was not due to blind intuition, but to a sound and thorough knowledge of the literature of diabetes and a critical sifting of the facts from the doubtful. The thoroughness of his knowledge was not revealed to all with whom he was in contact and he was misjudged by some in consequence.

Of his subsequent intensive work on cancer little has been heard, because of his desire not to clutter the literature with unproved results, but I know that he showed the same cautious, thoughtful methods as with insulin.

His early struggle made him very anxious to aid young



This photograph was taken at Victoria, British Columbia, during the 1936 annual meeting of the Canadian Medical Association on the occasion of the presentation by Mrs. Starr of the Frederic Newton Gisborne Starr Award to Sir Frederick Banting, Dr. J. B. Collip and Dr. C. H. Best. This award was established by the Canadian Medical Association in memory of the illustrious surgeon, its former president, Dr. F. N. G. Starr, and is reserved as ''the highest honour for the profession of Medicine in Canada, to be bestowed upon Canadian doctors who have, in the opinion of their confrères, outstandingly achieved in Science, Art or Literature, thus adding to the humanitarian or cultural life of our country''.

Left to right, Dr. J. B. Collip, Dr. C. H. Best, Mrs. F. N. G. Starr and Sir Frederick Banting.

The untimely death of Fred Banting has removed a very remarkable character and is a great loss to medical research in Canada. My early association with him during the early days of the discovery of insulin was in the first instance due to the fact that he was worrying about the surgical problem of ileus, and as I was doing some experimental work on intestinal movements, he came up to my laboratory from Prof. McLeod's during his spare time. He naturally discussed his own work with me and this continued during the following year when he became a member of my Department.

I am consequently quite certain that the following ideas, which led to his great discovery, were his own. (1) The original idea of making extracts from the pancreas after atrophy of the cells secreting the digestive enzymes. (2) The emergency use of secretin-exhausted glands for the preparation of extracts. (3) The use of fetal glands in whom the ordinary glandular tissue does not develop as early as the islet tissue. (4) The beef pancreas. Banting argued that as he had

men with a desire for research, particularly if they had even crude ideas. Not only in his own laboratory but in aiding in the creation of the Banting Research Foundation, by whose grants nearly two hundred workers have profited, he did much to create facilities for medical research. If he erred at all, it was in giving young workers in his laboratory too free a hand, yet there is no need for me to speak of the many papers which appeared in the names of his colleagues.

He was a sincere Canadian. He was anxious to keep promising men in Canada, and this led to his later work with the National Research Council and its Advisory Medical and Aviation Committees. He took this work as a duty, much as he disliked it because it kept him from personal work. But again medical science in Canada owes him a very great debt.

Banting was generous to all his co-workers, ever giving the credit for all they did and more, but also a good friend, kindly and thoughtful, and will be missed by all who were associated with him. VELYIEN E. HENDERSON

The death of Sir Frederick Banting is a great shock to us here. When in the Department of Pathological Chemistry in Toronto I had the good fortune to get to know Dr. Banting well. He showed keen interest in my own work, especially on glutathione and ergothioneine in blood. But that was one of the secrets of Dr. Banting's influence—his capacity for being interested in the research work of others—especially that of young people. This same quality, combined with his constructive imagination and organizing ability, gained the confidence of all people who came in touch with him, and enabled him to become what Dean Mackenzie of the National Research Council has called the "Key-man in Medical Research for the Empire".

His interpretation of "medical research" was generous because he realized that all scientific research moves on one front. Yet he knew what he was about. His great motivation in life was to relieve human suffering, and although always sympathetic with so-called "pure science," he got visibly more enthusiastic as the problem approached the medical and human level.

Before he visited here towards the end of 1938 he desired to have some arrangements made for him to meet the medical students. He gave perhaps the most inspiring address they had ever listened to, on the subject of medical research. His other purpose here was to find out what facilities we had for research. That has also borne fruit in the shape of financial assistance which has aided in the training of certain young people and yielded a modest harvest of new and useful knowledge.

I think that there are as yet few people in Canada who realize the greatness of Frederick Banting. That will come when his biography is written. I feel sure there is solid material for something as great as Eve Curie has written for the discoverer of radium. Frederick Banting will be the Louis Pasteur of Canada.

GEORGE HUNTER,
Department of Biochemistry,
University of Alberta.

Fred. Banting's loyalty to his Class, U.T. '17 M., was so intense that it is already legendary. Contrary to the usual occurrence, it did not reveal itself fully until after he had graduated and become famous. At College, he was quiet and self-effacing because of his shy and retiring disposition. His loyalty then was that of the average quiet hard-working student and not at all comparable to the almost fervent devotion to his Class which developed in the years of his great achievements. He was always deeply moved by a certain phrase in the Class song—"The best this side of Heaven". He never missed a Class dinner if he could possibly attend; and when he was elected to the Class presidency several years ago he said he appreciated that honour more than any other.

To him his Class was the natural repository for his faith and his confidences. He used it freely in times of stress and in times of triumph. Whenever Banting had achieved something unusual or was planning some important move we would be called together for a full and free discussion of his project. He insisted that these discussions be very frank and free, and he usually took the advice of the majority. It is no betrayal of confidence now to reveal that when he was offered his knighthood he demurred until he had thoroughly sounded out and weighed the opinions of his classmates.

The quiet, rich, kindly companionship that he gave to his Class was to be admired, and yet to be wondered at. The more he walked in high places, the richer and fuller became his friendship for his classmates, and the more he asked for and gratefully accepted their counsel. It was characteristic that he regarded any honour that came his way as an honour rather for his Class and his Alma Mater than for himself.

We, who were privileged to know this great man so well, regarded him as the living epitome of the heart of our Class; and now that he has been so ruthlessly torn from us our hearts are bruised and bleeding, but yet hopeful that in the eternal comity of things someday the Great Healer Himself will permit a full re-union of the Class of 17.

J. W. REDDICK

Dr. Oscar Lafayette Berdan, of Strathroy, Ont., medical health officer of Strathroy since 1909, veteran of the first Great War and active in military affairs, died suddenly on March 3, 1941,

Dr. Berdan was born in Longwood, Ont., in 1868, and had resided in Strathroy the last 52 years. He was a graduate of Trinity University (1889). He was lieutenant-colonel of the Middlesex Light Infantry for a number of years and carried that rank when he went overseas as medical officer of the 5th Divisional Ammunition Column in the last war.

Dr. Victor Bourgeault, of Wawota, Sask., aged 77, pioneer Western physician, died at Saskatoon on February 15, 1941. He came West in 1902.

He was stationed at the Duck Lake Indian reserve in Northern Saskatchewan for many years, accompanied the Royal Canadian Mounted Police in an expedition to the sub-Arctic, and in the Great War served in France and Serbia.

Dr. Bourgeault was a graduate of Victoria College, Cobourg (1888).

Dr. Edgar Browning, L.R.C.P., M.R.C.S., retired physician who practised for many years in Sherbrooke, Que., died in Montreal on February 5, 1941, in his 81st year. He had been in ill health since his retirement 12 years ago.

A native of Stamford, England, Dr. Browning graduated from Cambridge University and came to Canada in 1896. A few years afterward he began his practice in Sherbrooke.

AN APPRECIATION

With too great frequency, year after year, our medical profession witnesses the passing of its members who justly merit commemoration, and to whose memory we should dedicate a tribute of appreciation. But there are special persons who detain us more than others in reflection on past associations.

Such a man was Dr. Edgar Browning, who passed to his great reward last week. His was an academic career of a brilliancy given to few, associated with Oxford and Cambridge Universities in England, and subsequent teaching in Canada, followed by the practice of medicine.

His many years in Sherbrooke gave him a unique and enviable position in this community. A charm of personality was to his friends his greatest asset, and an urbanity and sympathetic understanding of human nature made him a solace and great comfort to his patients. There are few medical men of my acquaintance who were as ready at any time to sacrifice themselves to those in need as he. His generosity and hospitality were the priceless gifts of what he was—a perfect gentleman.

And so I pay tribute with gratitude for the privilege of an intimacy which one may cherish as being of the richest minds and finest associations given us in our chosen profession.

W. W. LYNCH

Dr. William E. Chambers, of Cleveland, O., formerly of Oakwood, Ont., where he practised for eight years, died early in January, 1941. Born in 1868, a native of England, he came to Lindsay, Ont., when a child and later moved to Toronto where he received his education. He was a graduate of the University of Toronto (1893).

Dr. William Alexander Cluff, of Saskatoon, Sask. Saskatoon lost one of its most colourful personalities in the death of Dr. William Alexander Cluff. His death on December 29, 1940, following immediately on that of his wife, shocked the community. He was not only a pioneer and pillar of the medical fraternity but was also widely known by a host of friends and patients throughout the province of Saskatchewan.

Doctor Cluff was born July 4, 1873, at Seaforth, in McKellop Township, Huron County, Ont., the son of David Cluff and Margaret Cardno. He spent his youth in Killarny, Man., where he was brought up on a farm. Later he taught school in the same district. He entered Manitoba Medical College and graduated in 1906. After an internship at St. Boniface Hospital he took up general practice at Strasbourg, Sask., for a short time. He next proceeded to New York to do post-graduate work in eye, ear, nose and throat. In 1909 he established himself in Saskatoon and continued in his specialty until the time of his death.

Alex Cluff was the second in his specialty to start practice in Saskatoon. His success was evident by his reputation throughout the northern part of the province. He held many offices in medical organizations. He was consultant in his specialty to the Saskatoon Tuberculosis Sanatorium, and Chief of the Department at St. Paul's Hospital, Saskatoon. At the Saskatoon Club he was a permanent fixture. His vacant place there remains as a monument to the affection in which he was held. He was a charter member of the Riverside Country Club. As an ardent golfer and charming companion on the course he was second to none. Alex Cluff had a keen mind, he loved the best books and was an omnivorous reader. By a strange coincidence several prominent Saskatoon business and professional men had been pupils of his in the little red school house on the farm when Alex was working his way through medical college. An everlasting friendship bound this circle together and some here still remain to grieve his loss.

Saskatoon mourns the loss of a prominent citizen; his numerous acquaintances feel the loss of a generous friend; and the medical profession will long remember him for his fraternal graces. One of his closest and dearest friends has best described the departed—"He was Lincolnesque in appearance, humour, heart and intellect".

D. M. BALTZAN

Dr. John Havelock Eastwood, of Peterborough, Ont., died February 17, 1941. He was born in 1864 and a graduate of the University of Toronto (1887).

Dr. Alfred Abram Farewell, of Harmony, Ont., died February 19, 1941. He was born in 1854 and held the diploma of L.F.P.S. (Glasgow) 1881.

Dr. Irvine John Leatherdale, of Jarvis, Ont., died on February 11, 1941. Dr. Leatherdale was born at Clearwater, Ont., a son of Mr. W. J. Leatherdale and the late Mrs. Leatherdale, in 1889. He graduated in 1915 (University of Western Ontario) and the following year went overseas with the Canadian Army Medical Corps. He was with the army of occupation in Germany, and returned to Canada in 1919. He established his practice at Jarvis in 1920.

Dr. Méderic Le Moyne, of Montreal, an eye and ear specialist, died suddenly on February 27, 1941, aged sixty-four. Born at St. Marc-sur-le-Richelieu, Que., he was educated at the University of Montreal (M.D., 1905), and studied in Paris from 1906 till 1910. He then began his practice in Montreal where he remained. A retiring man, much of his free time was spent in reading and studying.

Dr. William Fraser Mackay, of Port Washington, B.C., died in November, 1940. He was born in 1870 and a graduate of the University of Toronto (1900).

Dr. Hector McLean Paterson, of Rodney, Ont., died on February 22, 1941. He was born in 1871 and a graduate of the University of Toronto (1895).

Dr. Robert L. Shearer, of Edmonton, passed away on July 30, 1940, while on a visit to his old home in eastern Canada. He was 76 years of age. He was a McGill graduate (1901), and at first opened up an office in St. Chrysostome, Que. He practised there for several years, but in 1907 had the urge to come west and established himself in the city of Edmonton. In the true sense of the word he was a family physician and endeared himself to his many patients.

Dr. George John Ainley Thompson, of London, Ont., died on February 16, 1941. Born in Carbonear, Newfoundland, in 1861, Dr. Thompson was a scion of one of the oldest and most prominent families of that island and a direct descendant of its early pioneers. He was one of the best educated men in this part of the country and was a brilliant student in his early days, graduating from the old Model School in Truro, N.S., and later from McGill University with the highest honours, winning many scholarships and the gold medals in final graduation.

He secured his Bachelor of Arts, Master of Arts, and Bachelor of Divinity degrees from McGill University, as well as an M.A. degree from the University of Chicago. After being in the Presbyterian ministry for some 15 years he finally moved to London in 1902 where for two years he was chaplain at Victoria Hospital. Still anxious for further educational accomplishments Dr. Thompson entered the University of Western Ontario as a medical student, at the age of 42 and graduated with his M.D. degree in 1906. For twenty years he conducted a successful medical practice in London.

Dr. Walter Scott Turnbull, of Vancouver, B.C., died in November, 1940. He was born in 1878 and a graduate of the University of Toronto (1903).

CORRIGENDUM

In the March issue of the *Journal* announcement was made of the death of Dr. James Franklin Adams, of Windsor, Ont. We have it on excellent authority, that of Dr. Adams himself, that the statement was incorrect and that he is very much alive. It seems that one of our usually reliable sources of information made an incorrect transcription from a daily newspaper. The item in question referred to Dr. James Franklin Adams, of Ann Arbor, Mich. We hasten to assure Dr. Adams, of Windsor, Ont., of our great satisfaction at his news and our regret if the false report has occasioned him any annoyance or harm.

News Items

Alberta

A plebiscite has been taken as to whether the Alberta Division of the Canadian Medical Association will abandon the idea of holding a September meeting, and, in its place, accept the invitation from the Manitoba Division to meet in Winnipeg at the time of the Canadian Medical Association meeting in June, 1941. While the final results are not yet known, a large number of the Alberta profession are planning to go to Winnipeg, yet the general feeling is that it would be a mistake to forego the Alberta Convention this fall.

As usual the University of Alberta, in collaboration with the Alberta Division of the Canadian Medical Association, is putting on a refresher course at the University in May next. The University, being quite democratic, has sent out a plebiscite. In this plebiscite over 100 subjects are listed to give the members of the profession an opportunity to state their preferences. These refresher courses are gradually growing in interest, many members of the profession not having missed a single course.

At the annual banquet held by the Calgary Medical Society, on Febraury 11, 1941, a very interesting item on the program was the presentation to Dr. George A. Anderson of an illuminated address and a life-membership in the society. A graduate of Toronto University, he is now the member of the profession

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who has the longest term of practice in Calgary of any of the one hundred men in this city.

When the Social Credit party came into power in 1935 the Government decided to reduce the number of commissioners on the Workmen's Compensation Board from three to one, all the old members retiring, and the new Commissioner appointed was Dr. Victor Wright. A recent Government announcement states that owing to the increased work of this Board it has been found necessary to appoint two additional commissioners. This has been done by the appointment of a representative of labour and a representative of industry.

The Cancer Committee of the Province of Alberta is starting a vigorous campaign of cancer education and contemplates a page article in the *Alberta Medical Bulletin* every issue.

The Council of the College of Physicians and Surgeons of the Province of Alberta is frequently appealed to for registration of Europeon refugees, but, as it is almost impossible to get satisfactory reports on the applicant's character and ethics, to safeguard the interests of the public the Council is restricting its registration to British subjects or graduates of Canadian and British universities.

Dr. A. Cherry, who was recently elected a representative on the Council for District No. 2, Lethbridge, has joined the R.C.A.M.C., and has left the province. Consequently there will have to be a new election in that district.

Operation of the Calgary General and Isolation Hospitals will result in an estimated charge to the mill rate of $90,089.57. Total expenses for the hospitals during the current year were estimated at $354,788.48, an increase of $56,199.27 over the actual expenses of 1940. The increase in the estimated expenditures is largely due to the opening of a new wing. The estimated revenue is $225,198.91. This is greater by almost $10,000 than the estimated revenue for last year. Indigent patients last year cost the city $60,000, so an estimate of $57,500 was allowed for the current year.

According to Dr. W. H. Hill, Calgary's Health Officer, cancer was the second chief cause of death in this city. There were 152 deaths from this cause out of a total of 885 deaths, an increase of 39 over last year. Violence and accidents accounted for the deaths of 45 persons last year, an increase of 4 over the year 1939. There was a slight decrease in the number of deaths from pneumonia, tuberculosis, diabetes and influenza. Diseases of the heart, arteries and kidneys caused 320 deaths, a decrease of 27 from the previous year.

Dr. G. M. Little, Medical Health Officer of Edmonton, reported the total of communicable diseases cases in 1940 was 5,946 as compared with 2,818 in 1939. Measles accounted for 2,994 of the 1940 total, and chickenpox 1,634 as compared with 608 in 1939.

G. E. LEARMONTH

British Columbia

Vancouver was honoured recently by a visit from Dr. Hendrik Dam, of the University of Copenhagen, discoverer of vitamin K. Doctor Dam gave an address to the Vancouver Medical Association on the subject, and one could not but be impressed with the tremendous amount of work and research of which the actual discovery of the vitamin was merely the last step. Doctor Dam is a chemist of very high standing, and he gave a fascinating turn to what in less dexterous hands might have been a dry and difficult subject to understand, for those who do not know much chemistry. His is the imaginative and deductive type of mind which leads to discovery.

The Osler Lecture of the Vancouver Medical Association, an annual feature of the year's activities, will be given this year by Dr. G. F. Strong, of Vancouver. His subject is not yet announced, but it will deal with the modern conceptions of cardiac disorders, and their treatment. It will be given on March 12th, in the Hotel Georgia.

In July, 1940, the *Bulletin* reported the preliminary stages of work that has been done by Dr. F. N. Robertson, of Vancouver, on a test for the presence of carcinoma in any given patient. Doctor Robertson has made his second report, which appears in the *Bulletin* shortly—and which shows considerable progress. He reports results on 134 cases, and an improved and simplified technique. It is much too soon yet, of course, to say anything definite, but the results seem to be remarkably constant, and show a very high degree of accuracy. Failures are recorded faithfully and analyzed carefully. The test is still in its early stages, but it would appear that there is here a very important avenue that should be explored thoroughly.

Dr. F. M. Auld, of Nelson, Past-president of the British Columbia Medical Association, went east lately to attend the meeting of the Executive Committee of the Canadian Medical Association in Ottawa, March 14th and 15th.

Lieut.-Col. Gordon C. Kenning has returned to Victoria from Regina, to assume the duties of D.M.O., M.D. No. 11. Lieut.-Col. R. A. Hughes, formerly D.M.O. here, is going to Regina to take Colonel Kenning's place.

The election for membership to the Council of the College of Physicians and Surgeons is now under way. There are contests only in District No. 1 where Victoria is the centre, and District No. 3, where Vancouver, with five candidates, is the centre. Elections take place early in April, ballots being counted on April 7th.

J. H. MACDERMOT

Manitoba

A by-law to authorize the council of the rural municipality of Edward, Manitoba, to engage a municipal doctor will be voted upon March 26th. If approved there will be an annual levy not exceeding two mills on the assessed value of all rateable property in the municipality for the purpose of paying the physician's salary.

The by-law proposes also to charge each family $5 a year and single persons $3 a year. The receipts from this source would be applied on lowering the amount to be paid on any levy rate decided by the council.

Should it become necessary to make a levy exceeding one mill, authority is asked to impose a minimum doctor's tax of $4 on each property owner.

Dr. Hendrik Dam, of Copenhagen, discoverer of vitamin K, delivered the Gordon Bell Memorial Lecture on February 26th in the University of Manitoba. The idea of the new vitamin had come to him after experiments on chicks. The vitamin can be recovered from grains, especially alfalfa, and from products of protein digestion. It is found in the fæces. The natural vitamin is fat-soluble. It acts by restoring the natural level of the blood prothrombin. More recently the substance has been prepared synthetically and the synthetic product is found more potent than that prepared from natural sources.

Dr. Digby Wheeler, President of the Winnipeg Medical Society, was in the chair. Dr. F. G. McGuinness moved a vote of thanks to Dr. Dam on behalf of the large audience present.

Dr. L. G. Bell addressed the Scientific Club of Winnipeg on March 11th. His subject was "Pain as a symptom".

ROSS MITCHELL

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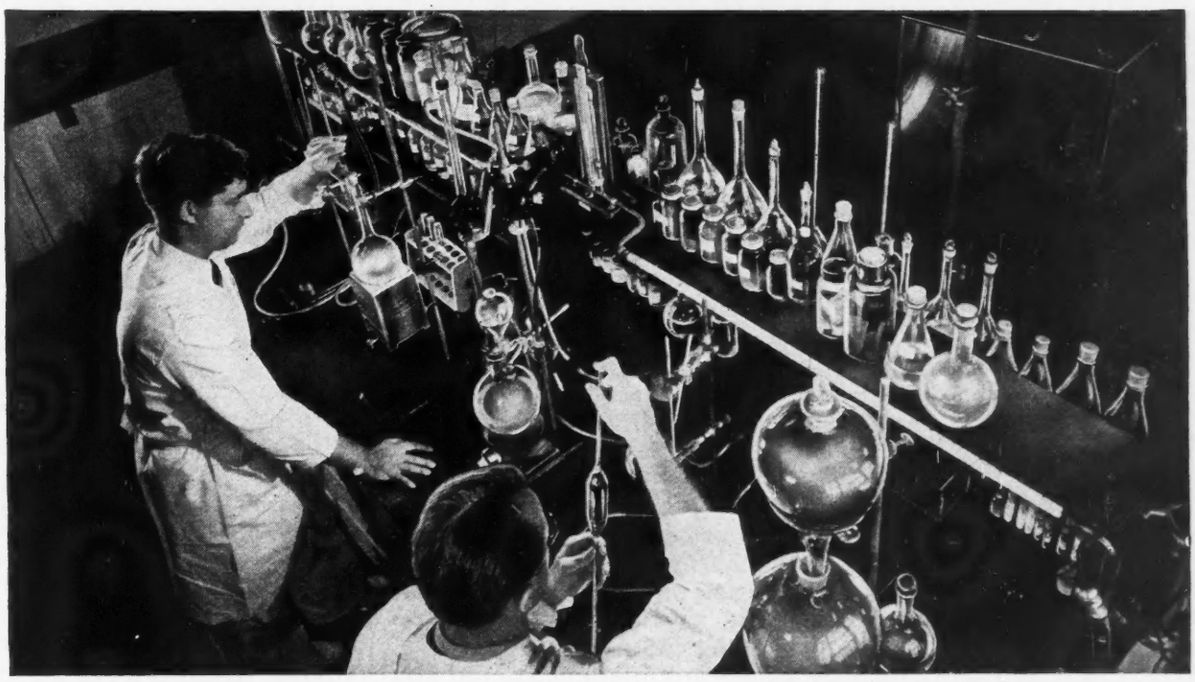

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New Brunswick

Dr. R. O. B. Monohan has established a practice in the specialty of eye, ear, nose and throat diseases in Saint John. He will be associated with Dr. R. T. Hayes.

Major W. O. McDonald and Dr. S. H. Calnek, both staff physicians of Saint John General Hospital, have joined the active service in the Royal Canadian Army Medical Corps.

The Local Public Health Authorities have reported an unusual number of cases of measles in recent months as well as sporadic cases of spinal meningitis. The epidemics are apparently on the wane.

Dr. A. S. Kirkland, Radiologist of the Saint John General Hospital, has been elected a member of the American College of Radiology.

Lt.-Col. G. A. Lyons, R.C.A.M.C., has been appointed temporary Commanding Officer of Camp Hospital, at Sussex, N.B.

The Military Gazette authorizes promotion to Captaincy, for Lieutenants H. P. Melanson, H. M. McLean, J. A. Melanson, A. L. Richards, R. B. Eaton, R. D. Landry, all members of No. 14 Field Ambulance, Active Army.

Dr. W. J. Baxter, Fairville, N.B., is again confined to hospital.

A. STANLEY KIRKLAND

Nova Scotia

New cases of diphtheria in Halifax are confined, in the great part, to pre-school children and adults. This is tangible evidence of the efficacy of the toxoiding done amongst the school children when the disease first appeared in November.

Hubbards and the south end of Halifax county almost had a doctor. He was on his way, when he paused at Halifax and, hearing another call, joined the army.

Showing a practical, extra-professional interest in the welfare of their communities are Dr. C. F. Messenger, recently declared mayor of Middleton, and Dr. J. W. T. Patton, secretary-treasurer of the Truro Board of Trade.

Dr. Roderick Cameron has moved to Musquodoboit Valley, taking over the practice of Dr. C. H. L. Baker.

Dr. J. Howard Mueller, of Harvard, addressed the Health Division of the Halifax Social Service Agencies on "Environment affected by war and the influence on infectious diseases and epidemics".

ARTHUR L. MURPHY

Ontario

Arrangements are almost completed for the annual meeting of the Ontario Division of the Canadian Medical Association. The meeting will be held at Windsor, Ont., May 26th to 30th. Outstanding speakers, fine exhibits, interesting discussions on medical economics, and excellent entertainment are the main features. Reservations at the Prince Edward Hotel should be made early.

Major-General E. C. Ashton, C.B., C.M.G., who, since giving up his practice at Brantford at the outbreak of war in 1914, has been attached to the permanent services, has been gazetted Lieutenant-General. Dr. Ashton had a brilliant career in the Canadian militia as an infantry officer, and went overseas in 1914 with the artillery. At the close of the war, having been thrice mentioned in despatches, he became Adjutant-General for Canada. Since then he has commanded various military districts and has held most of the important posts at militia headquarters. His many friends will be pleased to know of his promotion in recognition of his long and efficient service to his country.

Dr. N. C. Delarue, of Toronto, has been presented with the medal of the National Safety Council for his heroic resuscitation of Dr. F. B. Thomson when both were struck with lightning in Algonquin Park last summer. The presentation was made in the Lecture Room of the Toronto General Hospital before staff doctors and interns.

A thirty-nine year old, German-born, physician, who was befriended on his arrival in Canada, was sentenced last month to serve nine months definite and one month indefinite in the Ontario Reformatory on four charges of forging and dealing in narcotic prescriptions, to which he pleaded guilty.

Dr. J. H. Holbrook, of the Mountain Sanatorium, Hamilton, announces that the Hamilton death rate from tuberculosis during 1940 reached the low of 16 per 100,000 population—a goal which had not been anticipated for another ten years. Since the founding of the Mountain Sanatorium and the development of anti-tuberculosis work in and about the city the death rate has rapidly fallen. Four years ago, it was 23.7 per 100,000; in 1913 it was 121 per 100,000.

J. H. ELLIOTT

Quebec

Le Dr Henri Laugier, directeur du Centre de recherche scientifique de France a été nommé professeur titulaire de physiologie à la Faculté de Médecine et à la Faculté des Sciences de l'Université de Montréal. Le nouveau titulaire a été engagé pour deux ans.

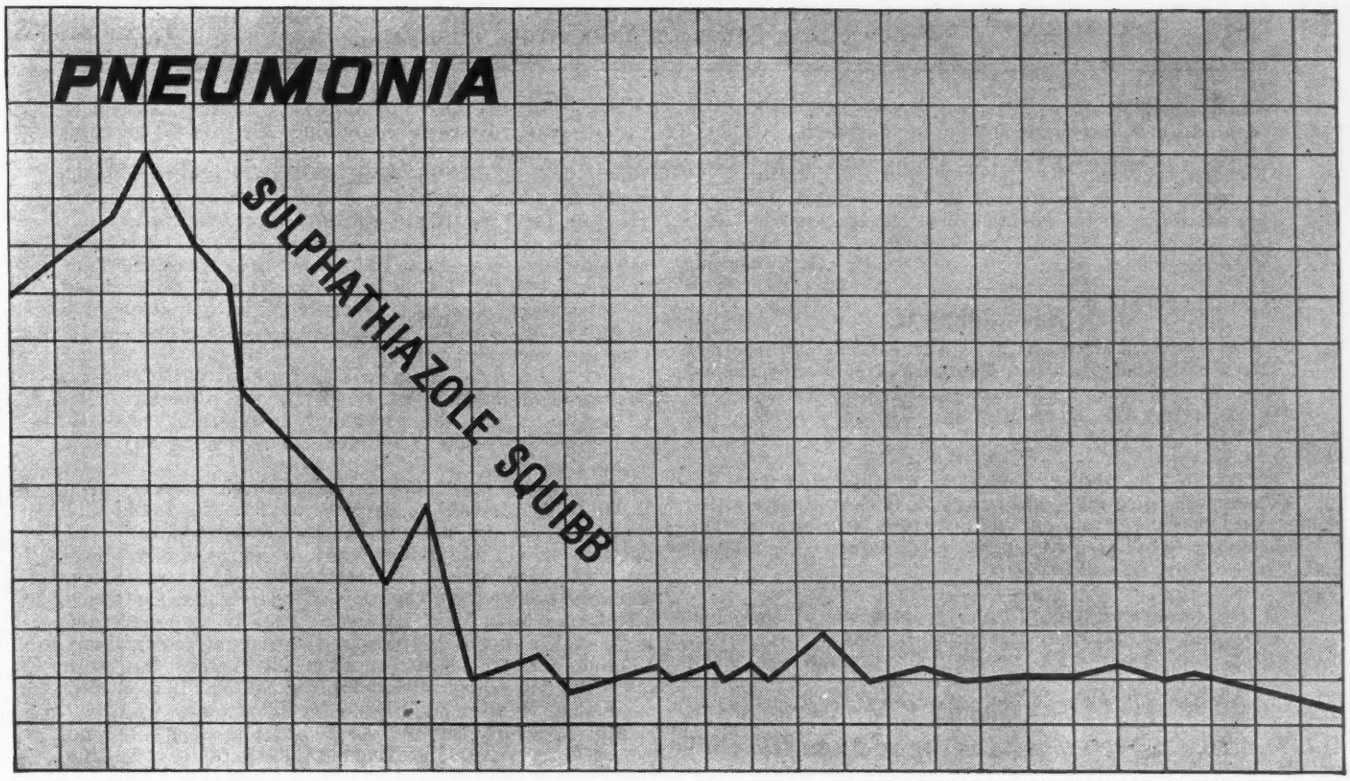
Le Ministère provincial de la Santé et du Bien-Etre Social donne les conseils suivants pour la dépense judicieuse d'un dollar destiné à l'alimentation: 20 cents pour le lait et le fromage; 20 cents pour les fruits et les légumes; 20 cents pour la viande, les œufs et le poisson; 20 cents pour le pain et les céréales; 20 cents pour les aliments sucrés, le beurre et les autres substances grasses.

Le Major L. M. Emard, ancien surintendant médical de l'hôpital Notre-Dame, a été nommé directeur des services médicaux du district no 3 pour l'entraînement des aviateurs. Ce district comprend le Québec, le N.B., l'île du P.E., et une partie de la N.E. et de l'Ontario.

L'hôpital du Sacré-Cœur, Cartierville, a élu pour 1941 le Bureau Médical suivant: *Président*, J. E. Samson; *Vice-président*, J. A. Vidal; *Secrétaire-Trésorier*, J. P. Paquette.

Le doyen de la Faculté de médecine de l'U. de Montréal annonce une séance publique pour honorer la mémoire de Sir Frederic Banting. Le Professeur Laugier sera le conférencier.

Dans son allocution de nouveau président de la Société médicale de Montréal, le Dr. Hector Sanche faisait les remarques suivantes au sujet des "Journées médicales": "Nos Journées médicales d'octobre dernier ont été intéressantes et appréciées. L'automne prochain nous recommencerons et nous espérons que ces Journées deviendront traditionnelles. Trop de profit nous arrive à tous par ces séances cliniques pour que nous les laissions jamais tomber."



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La séance du 4 mars dernier de la Société médicale de Montréal a été consacrée à l'étude du cancer. MM J. E. Gendreau, O. Dufresne, L. Jutras, G. Pinsonneault, J. N. Roy, N. Allaire, V. Latraverse, L. P. Laporte, P. Caumartin, E. P. Grenier et R. Roux y ont fait le symposium de la lutte anticancéreuse et des aspects variés des cancers de la peau, de la bouche, du poumon, de l'utérus et du rectum. JEAN SAUCIER

Saskatchewan

At the regular meeting of the Regina and District Medical Society held on February 21st Major Harold Spooner, of the Eighth Base Hospital, formerly of Regina, was the guest speaker. He gave a paper on "War injuries".

Dr. W. A. Dakin, chairman of the committee on Economics, has notified doctors in Saskatchewan cities that there will be no relief grant for any of the country cases treated in the city during the 1940-41 relief year.

Dr. George H. Lee, formerly of Prince Albert, has an office in the Medical Dental Building, Vancouver, B.C. LILLIAN A. CHASE

General

THE BANTING RESEARCH FOUNDATION

The annual report of the Honorary Secretaries of the Banting Research Foundation for the year 1939-40 discloses that its income was distributed in two ways. A block grant of slightly less than one-half its income was made to the Banting and Best Chair of Medical Research of the University of Toronto and eighteen individual grants were made to research workers in various parts of Canada who submitted problems to the Foundation which were approved by the Trustees. Summarized reports of the results obtained on these eighteen individual grants follow.

Four grants were made for studies on chemotherapy. On one, Dr. W. J. Auger, Hospital for Sick Children, Toronto, found that sulfapyridine, and sulfapyridine plus Type I antipneumococcic rabbit serum caused a marked reduction in the incidence of empyema in Type I pneumonia. He also devised a plate method for determining the relative potencies of various chemotherapeutic agents against pneumococci. He also found that novocaine in body fluids has a powerful antichemotherapeutic effect.

An assistant was provided for Dr. P. H. Greey, University of Toronto, to enable him to test some seventy sulfanilamide compounds synthesized in the Department of Medical Research, University of Toronto, as to their therapeutic effects in combating staphylococci. Some gave promising results in the test-tube but failed to protect animals against staphylococcus infection.

Dr. W. Hurst Brown received a grant to allow x-ray studies to be made on a large group of patients who had previously received large doses of sulfapyridine, in order to see whether any of them had developed urinary calculi owing to the deposition of the acetylated sulfapyridine. As only two out of 30 patients had any suspicious findings, the danger of calculi formation in properly handled patients does not seem great.

Dr. Karl Sternbach, University of Toronto, tested the chemotherapeutic effects of many new organic compounds on meningococci and gonococci. Seven new drugs tested were found to be as potent as sulfanilamide in combating meningococci in mice and some of these were less toxic than sulfanilamide.

Five grants were made for various researches on hormones. Mr. M. M. Hoffman, Dalhousie University, with Dr. Heard, isolated a hitherto undescribed member of the female sex hormone series in equine pregnancy urine. Mr. A. F. McKay in the same Department discovered a previously undescribed isomer of the male sex hormone. Dr. A. W. Ham, University of Toronto, is investigating the effect of anterior pituitary extracts on bone repair. Extracts containing the growth principle were not observed to have any stimulating effect on the repair of fractures in young animals. Their effects on repair in older animals, and the effect of hypophysectomy on bone repair are still under investigation.

Dr. P. G. Weil, Royal Victoria Hospital, Montreal, continued studies on the relation of the cortical hormone to shock. With Dr. Rose it was found that giving desoxycorticosterone and adrenal cortical extract together significantly reduced the mortality from experimentally produced surgical shock.

Mr. H. C. Read, Dalhousie University, performed experiments in the hope of clarifying the respective rôles of the testes and the adrenal in maintaining prostatic and seminal vesicle structure. The results are now being studied.

Two grants were made for research on vitamins. Dr. D. G. H. MacDonald, University of Toronto, found that supplying fat did not prevent the slow heart rate that develops in vitamin B deficiency, although fat will prevent or cure other manifestations of B deficiency. Thiamin was found to be the only pure substance which affects the heart rate. A liver factor is also concerned in the slow heart-rate observed in B deficient diets. Thiamin was found not to affect the tone of the large intestine, but evidence was obtained of some unidentified member of the B complex altering bowel tone. The thiocrome procedure for the assay of thiamin was found accurate for pure solutions, but unsatisfactory for the measurement of thiamin in urine. Miss H. M. Perry, University of Toronto, investigated vitamin C and P deficiency with regard to hæmorrhages. In guinea pigs vitamin C prevented hæmorrhages, but vitamin P did not. Evidence was found that vitamin C is not the only factor needed to prevent capillary hæmorrhages in man; hence estimation of vitamin C needs or deficiency should not be based on tests depending on the strength of capillary walls.

Seven other grants for various other researches were also made. Dr. Edith Anderson, University of Toronto, prepared and investigated the physiological actions of L-sugars. There was reason to hope that these might inhibit the anaerobic fermentation of cancer cells but, on testing, L-sugars proved to be inert biologically.

Dr. K. C. Fisher, University of Toronto, investigated the relation of anæsthesia to cell anoxæmia. It has appeared from the effects of ethyl carbamate that it is possible to divide the normal oxygen consumption into two fractions which presumably represent two separate enzyme systems. These are depressed by different concentrations of narcotics. This finding removes certain objections to the hypothesis that narcosis is due to an inhibition of oxygen consumption.

Miss E. G. Huntsman, University of Toronto, received a summer grant to study the cause of hyaline degeneration of arteries in experimental hypertension. A new method for estimating blood pressure which depends on the observance of colour change in the tail was devised for use in young rats. Hyaline degeneration of arteries was found to develop as soon as the seventeenth day. The work is still in progress.

Dr. E. E. Kuitunen continued her studies on the incidence and types of intestinal parasites in Toronto. Twenty-eight per cent of 324 patients in the Toronto Western Hospital were found to harbour some species of protozoa or helminth. Fresh pineapple juice was found *in vitro* to be an effective anti-helminth, but in the presence of gastric juice of 0.2 per cent HCl, on administration to two cases, it was ineffective. Three hundred diaphragms from autopsies at the Toronto General Hospital and the Hospital for Sick Children were examined for *Trichinella spiralis*. Seven positive results were found; all of these unrecognized clinically. Drs. T. F. Nicholson and D. L. Selby, University of Toronto, found on causing degeneration of the distal tubule of the kidney by uric acid that no decrease in the clearance of inulin, creatine or urea resulted, but that the ability of the kidney to reabsorb water and salt was impaired more markedly than when the proximal tubule

In Obstetrical and Surgical Practice

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was damaged. Experiments on the effect of sulfanilamide on the kidney showed that no damage was produced when concentrated solutions were injected directly into the renal artery.

Dr. Bram Rose, Royal Victoria Hospital, Montreal, found after experimental surgical shock that there was a decrease in the blood histamine and an increase in plasma histamine. After anaphylactic shock in the rabbit a rapid and marked decrease in the histamine content of blood and plasma occurred. A decrease in the blood histamine has been found in human cases of acute angio-neurotic œdema. Dr. E. G. Young, with Miss H. P. Wentworth, Dalhousie University, worked out a method for the assay of allantoin in blood in which the Rimini-Schryver reaction for allantoin was applied to its colorimetric estimation. This method allows the estimation of allantoin in 5 ml. of blood with a probable accuracy of 10 per cent, using an ordinary colorimeter.

V. E. HENDERSON,
A. W. HAM,
Honorary Secretaries.

Book Reviews

The Parasites of Man in Temperate Climates. T. W. M. Cameron. 182 pp., illust. $3.00. University of Toronto Press, 1940.

The need for this little book is stated succinctly in the preface: "Parasites are not confined to the tropics; many are common in temperate and sub-tropical climates as well, while some are actually confined to the temperate zone . . . Moreover, we no longer measure the distance from the equator in miles, but in hours; increasing numbers of persons visit the tropics yearly, and the medical man of north temperate climates can no longer afford to be wholly ignorant of diseases outside of his immediate zone of interest." The book is based on the course of animal parasitology given to McGill medical students, and is intended for physicians practising in temperate and sub-tropical zones, rather than for the specialist in parasitology. Particular attention is given to parasites which occur in North America and in Great Britain.

Three large sections deal respectively with protozoa, helminths and arthropods, a shorter section with leeches, and finally there is a short section on the technique of procedures designed "to enable a medical practitioner to diagnose the parasite and to prepare specimens to be sent to a laboratory for identification." The book is excellently illustrated throughout with valuable diagrams of life-cycles, diagrams for differential diagnosis, photographs and photomicrographs. Treatment of infected patients is dealt with, as is also the preventive treatment of food, in connection with which numerous comments of which the following is illustrative are practical and illuminative: "The high incidence of sub-clinical trichinosis . . . is probably traceable to cooked pork. In spite of our belief that the Anglo-Saxon peoples overcook pork, there is no doubt that it is often not cooked sufficiently to destroy the encysted parasites." The book "reads" very easily.

A Guide to Human Parasitology. D. B. Blacklock and T. Southwell. 4th ed., 259 pp., illust. 12s. 6d. H. K. Lewis, London, 1940.

The fourth edition of this text has recently appeared. The text was written, as our readers may recall, for students in tropical medicine at Liverpool University, to accompany and to epitomize the lectures in parasitology there. Few alterations have been made in this edition, and in its essentials it remains unchanged. It will prove of value to those who may have occasion to diagnose tropical parasites and who do not wish to purchase more expensive texts.

Clinical Urology. O. S. Lowsley and T. J. Kirwin, with drawings by W. P. Didusch. 2 vols., 1684 pp., illust. $10.00. Williams & Wilkins, Baltimore, 1940.

It is quite probable that there are enough textbooks on urology. None the less, a new book on urology is usually opened with an eager expectancy, which in this particular case has been amply rewarded. The authors of these most attractive volumes should be well known to your readers, as having published a textbook on urology in 1926. It is no discredit to them or their earlier work to say that these volumes represent a definite improvement over the earlier one. While this may be due to the increasing skill and experience of the authors, and other considerations, the generous supply of excellent illustrations by the talented medical artist Mr. Didusch has greatly contributed to this happy result.

As the title suggests, the work is written from the clinical point of view, and, as the authors admit, with special reference to the surgical aspect of urology. None the less, the authors have not neglected the purely scientific considerations so necessary to a proper understanding of their clinical aspects. Your reviewer cannot forbear from again drawing attention to the lucid and revealing illustrations which the authors have selected so generously. In fact, it is this feature that has given to these volumes their special character and value.

The two volumes are most attractive. They are satisfactorily solid, being printed on good heavy paper. One feature is much appreciated by your reviewer; an adequate and well chosen bibliography is appended to each chapter. This adds very greatly to the convenience of the reader.

This work ranks easily with outstanding urological publications of recent years, and can be recommended to all who are interested in urology, both teachers and students.

Medical Diseases of War. A. Hurst. 326 pp., illust. $4.75. Macmillan, Toronto, 1940.

During the War of 1914 to 1918 Sir Arthur Hurst was the author of a book entitled "Medical Diseases of the War." Two editions were published—the first in November, 1916 and the second in March, 1918. By the end of 1918 he had collected material for a third edition, but the armistice made its publication unnecessary. The present volume, entitled "Medical Diseases of War" may be regarded as the third edition of this work, brought up to date in the light of knowledge acquired since 1918.

Almost one-half of the book is devoted to neurological disorders with special attention to various types of hysterical symptoms. Other chapters deal with trench fever, typhoid and paratyphoid fevers, bacillary dysentery, epidemic jaundice, tetanus, nephritis, soldier's heart, gas poisoning, scabies, pediculosis and the seborrhœic state. It will be noted that the author has made no attempt to cover all the medical diseases likely to be met with in war. For example, the list of subjects does not include pneumonia, cerebrospinal meningitis and the common contagious diseases as well as many of the conditions which would probably be encountered in an Eastern campaign. The possible prophylactic and therapeutic value of sulfanilamide and related compounds in time of war is not discussed.

The ability of the author to draw on his extensive experiences in the last Great War makes the book of special value. All physicians, including those engaged in civilian practice, should find much of interest in it. It will prove extremely helpful to officers of General Hospital Units, regimental medical officers and others who are in daily contact with medical diseases prevalent under war-time conditions.

Strange Malady. W. T. Vaughan. 268 pp. $3.00. Doubleday, Doran, New York, 1941.

A more or less popular version of the allergic problem by one well qualified to write it.